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ULTIMA THULE;

OR,

A SUMMER IN ICELAND.

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DANISH FISHING COMPANY'S STATION AT BERUFJÖRÐ.

Frontispiece, Vol. II.

ULTIMA THULE;

OR,

A SUMMER IN ICELAND.

BY

RICHARD F. BURTON.

With Historical Introduction, Maps, and Illustrations.

VOL. II.

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ULTIMA THULE;

OR,

A SUMMER IN ICELAND.

CHAPTER VI.

THE PRESS—VISIT TO THE LATIN SCHOOL—LIBRARIES AND COLLECTIONS—GUNNLAUGSSON'S MAP—NOTE (NATURAL HISTORY AND ANTHROPOLOGY).

THE first newspaper printed in Iceland began in 1775: in the catalogue of writers prefixed to the work of Uno Von Troil, it is called the *Isländische Zeitung*. This Islendingur, not long defunct, gained considerable reputation; the back numbers are to be found at the College Library. At present the island publishes three periodicals, of which two are printed at the capital. The first, which appears regularly twice a month, is called the *Thjóðólfr*,[1] an old Icelandic Christian name; and in 1872 numbered its twenty-fourth year. The sheets vary from one to two, according to the amount of news; the columns are double, the page is about 10 inches by $8\frac{1}{2}$; the subscribers' list shows some 1100, and the yearly subscription is \$1, 2m. 0sk. The editor, Hr Procurator Jón Guðmundsson, a barrister, conducts it worthily, and with great intelligence; he is outspoken, but not factiously so. The *Tíminn* (Times) appears once a month; its politics are of the "Hlut-lausir," lot-less, or neutral tint, which would have caused it to be ostracised at Athens; and there is some mystery

[1] From Thjóð, old High Germ. Diot, a people, a nation; often found in composition, as Thjóð-fundr = constituent assembly, Thjóð-rekr = Germ. Diet-rich, and Thjóð-marr = Germ. Dit-mar (Cleasby).

about the editor, who is usually supposed to be Hr Páll Eyúlfsson, silversmith and cicerone. The third is the *Norðanfari* (Northern Traveller) of Akureyri,[1] the chief commercial station in the north. It usually comes out some twenty-six times a year in the full size of four pages, and at intervals with reduced proportions: matter is fearfully scarce during the four winter months, when there are no mails, and local subjects must be at a premium. As regards the sparring of rival journalists, it is, to quote Arlequin's saying, "tout comme chez nous."

The history of printing-presses in Iceland has been copiously treated. They were first established at the two bishoprics of Skálholt and Hólar; privileges were then granted to Leirá, Viðey,[2] and Hrappsey; and now there are two, in Reykjavik and Akureyri. The office at the capital is in High Street, where three men work the two presses and four cases: the folding machine has yet to be introduced.

The Icelandic Literary Society (Hið Íslenzka Bókmentafèlag) still survives: after passing through the usual phases, it is now loyal and respectable. Concerning the first, or Societas Invisibilis (Hið ósynilega Fèlag), established in 1760, ample information will be found in Bishop Pètursson's "Hist. Eccles. Isl." (pp. 339-342). The second (Hið Íslenzka lærdomslista fèlag), dating from 1779, is treated of in Mackenzie (chap. vii.): it admitted corresponding and honorary members. The third (Hið konunglega Islenzka lærdómslista fèlag) in 1787 became a Royal Society: it is interesting because it first treats of the sulphur mines and trade of Iceland in the reign of Frederick II. (1336-59); and the presiding genius was the celebrated Jón Eiríksson. This worthy, whilst under the influence of melancholia, committed suicide, a proceeding as rare amongst men of

[1] Akureyri had another paper, the *Gángleri*, which ceased publication in 1872. It contained some valuable articles, especially one headed "What am I to pay to the Thing?" and the answer was apparently not easy, as it occupied seven issues, beginning with February 7, 1871.

[2] It was here in Henderson's time, and it was disliked because charged with "a tendency to introduce the illumination of the German school." At present, besides the presses of Reykjavik and Akureyri, there is a third at the Elliðavatn, one hour's ride from the capital. It belongs to a certain Hr Benedikt, ex-assessor of the High Court of Justice, who was removed for the best of reasons. He has no licence to print.

distinction in the post-Christian as it was common during the pagan times of Iceland. I inquired in vain about the savant's bust, which was broken on the voyage to this island; my informants had only a hazy idea that the head had been returned to Copenhagen. A medallion of the great Scandinavian literato, now in the hands of Hr Sigurður Guðmundsson, shows him in profile, with protruding chin and brow, a nose worthy of Fielding, a long-tailed wig with *ailes de pigeon,* and a frilled shirt.

The fourth Royal Society of General Instruction in Iceland (Hið Konunglega islenzska Landsuppfrædíngar Fèlag) was established by Magnús Stephensen. The fifth, Vísinda og Upplýsingar-Stiftan (Institute for Knowledge and Instruction), was conducted by Björn Gottskálkson, when the press was removed from Hrappsey to Leirágarðar. The sixth, which actually exists (Hið íslenzka Bókmenta Fèlag), was founded by the celebrated Professor Rask in 1816, on March 30, which is kept as its birthday. The bye-laws were printed in Icelandic and Danish at Copenhagen in 1818: the Skýrslur, or annual report, first appeared in 1825.

The object of the Society is to publish and circulate, at the cheapest price, useful, standard, and also original books, together with newspapers and periodicals. Such literature is still a prime want in the country, and an enterprising publisher like Mr N. Trübner might do a "good stroke of business." The two branches, Danish and Icelandic, choose their own executive every year, and keep separate accounts, which are blended in the general annual statement: the latter is published by Hr Bianco Luno of Copenhagen, in French and English, as well as in Scandinavian. The books are also printed at the metropolis, and sent out to the island. The *magnum opus* is the annual review, historical report, and magazine of general literature, classically called Skirnir, the Narrator, or Eddaic messenger of Freyr.

The Society numbers some 720 Fèlagar (members), besides a few corresponding and honorary, French and English, German and "American." The subscription is $3 per annum. The Icelandic branch meets, besides extraordinary occasions, twice a year, in March and July; the latter is the Synod time, corresponding with our May meetings; and the venue is at the Priests'

Seminary for want of other room. The first president was Hr Ární Helgason; Bishop Pètursson has held it for twenty years, and it is actually tenanted by Hr Jón Thorkelsson, head-master of the Latin School. The rector, Hr Jens Sigurðsson, is the treasurer; Hr Páll Melsteð is secretary; and Hr Hálldór Guðmundsson acts librarian.

Formerly there was a high school at each bishopric, and a prime grievance of the island is that the two having been reduced to one, the northern and eastern provinces are put to uncalled for expense and inconvenience. Children learn the "four R's" at home from their parents: hence the unalphabetic are rare, and some priests even refuse to marry them. At the capital both sexes may attend a preparatory school in Harbour Street (Hafnarstræti), till the age of confirmation, or fourteen. The cost is small, $8 per annum, but all the pupils, even those who come from afar, must live in the town. Besides the elements of knowledge, they learn history and geography, Danish and Icelandic, but neither French and English. Music is little cultivated, the piano is not unknown, but the singing is chiefly confined to hymns, and of these few are original. Dancing and gymnastics are equally neglected.

I visited the Supreme Court, a low building in the row north of the Landfógeti or treasurer's office, under charge of the stiff old usher. The left room is for the town councils; the right for the administration of justice, as shown by the oval table, by four chairs within, and by two small tables and bench without the cross-rail. It would be hard to swing a cat, with anything like safety to the animal, inside this temple of Themis, and its mean proportions gave me satisfaction. The next move was to the Latin School, which has now taken the place of the Schola Bessastadensis. The highly uninteresting building, already collapsing in its twenty-ninth year, is approached by a bridge spanning the foul drain, and is fronted by a sloping, grassy lawn kept in decent order. The civil hall-porter acts cicerone. Turning to the left of the hall, where a big clock stands, we find the younger classes preparing for examination, a professor walking about to prevent "cribbing:" this is the written portion; the *vivâ voce* process will be conducted in the front hall of the

first floor, where the Althing meets. It is a fair-sized room, with the royal portrait at the bottom opposite the entrance, fronted by a long desk of green cloth: the rest of the furniture consists of benches covered with green baize. The governor sits on the proper right of royalty, and the president of the Diet on the left. The last session (1871) was described to me as somewhat stormy, and the nays (neis) far outnumbered the yeas: the latter (já), when reiterated in excitement and pronounced *yäu*, sound somewhat comically, a manner of bark, yow, yow, yow.

There are two dormitories in which the little beds stand side by side. Everything is of the humblest description; even the ceiling of the professors' sitting-room wants repair. A change to the capital has somewhat modified the excessive uncleanness which foreign visitors remarked at Bessastaðir, but there is still much to be desired.

In the Introduction I have given the details of the High School. The programme leaves little to be desired, but sensible Icelanders agree with strangers that the education is sterile and not "serious," in the French sense of the word invented about 1830. The pupils learn a smattering of many things, but nothing thoroughly. This is doubtless the result of a social condition in which only superficial knowledge is at a premium: the same may be remarked in the United States and in the Brazil, compared, for instance, with Oxford and Coimbra, where students find specialties necessary.[1] The consequences of studying Icelandic and Danish, Latin and Greek, English, French, and German, are that very little can be learned. At the beginning of the century every priest could converse in Latin—I have now met many who cannot speak a word of it, and I have not met one who spoke it even tolerably. The useful cosmopolitan dialect has been exchanged for "modern languages:" similarly the Magyar now cultivates his own dialect, and has

[1] And even England lacks the foundations which encourage specialties in Germany. What we want is a number of students who are able to devote their time to pursuits never likely to pay in a publishing sense. Some day, perhaps, one of those philanthropists who give half-a-million sterling to an hospital or to a church, will provide the necessary accommodation in the "Temple of Science" —£15,000 per annum, divided into incomes ranging from £200 to £300, would supply a great desideratum.

abandoned the Latin which, to him almost a mother-tongue, kept Hungary in contact with the culture of the West.

The pupils are hard workers and have excellent memories; they must chiefly, however, depend upon books, and the result is that whilst many of them collect a fair stock of phrases, and pronounce them remarkably well, they can hardly understand a word of the reply. Another and a severer charge is brought against the establishment. The dissipations of Reykjavik appear very mild to a dweller in European cities, but they are, comparatively speaking, considerable. Youngsters between the ages of fourteen and twenty-three easily learn to become boon companions, and to lay the foundation of habits which affect their after-lives. The professorial Hetæra being unknown, the students are apt to make any connections which present themselves, and intrigues with the "ancilla" sometimes end in marriage perforce. Thus the country clergyman or the franklin begins life burdened with a helpmate utterly unmeet for him; who neglects his house and children, who thinks of nothing but dress and "pleasuring," and who leads him rapidly on the road to ruin, in a country where all domestic comfort and worldly prosperity depend upon the "gudewife." Hence the old system of schools at Skálholt and Hólar, and even at Bessastaðir, is greatly preferred, and, perhaps, even now the seminary might with profit be removed to Thingvellir. Here it has been proposed to lay out a model farm, where the alumni could add agriculture to their pastoral acquirements.

About the age of twenty-three the Skóla-piltar, or pupils, become "students," that is to say, B.A.'s. In order to enter the learned professions, especially the law, they matriculate at the University of Copenhagen, where they are housed and receive annual stipendiums of £15 to £20. They distinguish themselves by thrift and canniness, emulation, energy, and abundant application, when the place agrees with them. But often they suffer from the insidious attacks of a climate which even Englishmen would call rigorous; the comparative mildness acts upon them as tropical heat upon us, and in not a few cases they die of pulmonary disease.

Medicine may be studied at Reykjavik. The school is simply

a room in the Hospital, and subjects for dissection cannot be had without a permission, which is generally refused. On the other hand, students have the benefit of lectures from thoroughly able men, Drs Hjaltalín and Jonassen. The course lasts from three to five years, and after an examination the Læknir (M.D.) may either practise in private, or aspire to become "physicus," at some out-station.

Theological students attend the Priests' Seminary at Reykjavik. It consists of two lecture rooms, fronting the sea, in Hafnarstræti, and furnished with chairs and black desks, a stove, and a list of lectures. The candidates who reside in the town are taught by the Lector Sigurðr Melsted and two "Docents," Hannes Árnason and Helgi Hálfdanarson. The examinations take place in June and August; the former tests their progress in logic and psychology, the latter in theology, ecclesiastical history, exegesis, and canon law. The course lasts at least two years, and at the age of twenty-five, after the final examination, students obtain the degree of "candidat." Some do not choose to be at once ordained, reserving the final step for later in life, but the material advantages of the profession in Iceland never allow it to lack recruits. The result of such a course is to saturate the mind with the Bible, learnt from translations and explained by the individual opinions of swarming commentators. It makes men "fall down and worship" (as the great Spinoza has it) "an idol composed of ink and paper, instead of the true word of God." And when the superficial and ill-taught "divine" has to do battle with a polemical Catholic or a pugnacious Rationalist, the action generally ends in a ludicrous defeat. I especially allude to the late controversies with M. Baudouin, and the disputes with "Free-thinkers," recorded by Professor Paijkull: the Great Book, or Commentary on St John, written by Candidat (Theologiæ) Magnús Eiríksson, is attacked by an "Old Pastor," with an obsolete virulence worthy of the Inquisition.

I was introduced to Professor Hannes Árnason, the geologist of the Government College, who kindly showed me the collections of natural history. Of botany there is none, the hortus siccus seems to be generally neglected in the smaller museums of the world: the student must content himself with Dr Hjalta-

lín's work, and the "Flora Danica," of which a good, but untinted, copy is found in the College Library. Zoology is confined to a few stuffed birds.[1] The mineralogical collection is richer; mostly, however, it is a *rudis indigestaque moles;* the upper part of a chest will be labelled, and the lower drawers in most unadmirable disorder. Moreover, where the traveller wants only local specimens, they are mostly general; for instance, a small cabinet of fourteen drawers contains Germany.[2]

We then proceeded to the College Library, a detached building of solid construction, but suffering sadly from damp accumulating in the porous stone. In the big bluewashed room fires are neglected, consequently the books are damp and mildewed.[3] At the bottom,

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[1] The principal are the red-breasted merganser (*Mergus merganser*); the rare lapwing (*Vanellus cristatus*); the water-rail (*Rallus aquaticus*), also uncommon; the thrush (*Turdus eleacus*); the willow wren (*Motacilla trochilus*); and the little regulus with big feet and bill (*Troglodytes borealis*), the Pjetur Nonsmad, or Peter Dinner of Norway, because he is not seen after noon, and the Fugle Kongr, because he rides the eagle. Curious stories are also told about the wren at Trieste; he appears and disappears with the thrushes, avoiding the heats of summer: the same is said about the Abú Hin (the father of Henna) at Damascus. The blackbird (*Turdus merula*) is sometimes driven to Iceland by southern gales.

[2] Of local specimens we were shown varieties of the Mó-berg (Palagonite tuff), especially from the Seljadalr, which feels soft, between chalk and steatite, some white or dull yellow, acted upon by acids; others brown and black. Palagonite conglomerate with large pieces of felspar. Blue compact basalt from Kjallarnes, with and without drusic cavities; hexagonal basalt; reniform pebbles of the same material. Jaspers, red, yellow, and green, from the north, the latter containing copper. Dolerite or greenstone. A collection of Hekla lavas, passing from the porous to the highly compact. Micaceous "glimmer schiefer" studded with garnets. Zeolite and Iceland spar; silicates of lime. Quartz needles from the Geysir, and other quartzes, uncrystallised and crystallised into fine hexagons, large and small, often contained in bolides. Aluminous clays and oxide of iron, some with regular angles and metallic revetments. Concretions from Laugarnes and the Geysir, the stalks of plants resembling petrified bones. The *Cyprina Gaimardi* and *Byssomea arctica* from the north. Other shells: *Balanus, Mya truncata, Venus Islandica, Lepas, Bulla,* and *Turbinus.* True cannel coal from Suderoe, to the west; lignites, old and new; pieces of Surtar-brand, flat, and showing impressions of leaves; large fragments of true pitch-stone resembling, and others in transition to, obsidian. Hrafntinna (Raven-flint, *Gagates Islandicus*), obsidian or Iceland agate, black and liver-brown, like Jews' pitch or asphalt, from Mý-vatn and the Hrafnatinnuhraun of Hekla. Henderson (i. 178) mistranslates Hrafnutinna, "*Piedra de Galinazzo*, or raven-stone" (for buzzard-stone). Agates, chalcedonies, and transitional opals, from Múla Sýsla, Tindastoll, and Heimaklettur, in the Vestmannaeyjar: according to Professor Abel, the south-eastern coast affords the noble stone, and the islanders believe that about 1821 a Mr Methley (?) carried home a valuable collection. Professor Árnason kindly gave me a little box of chalcedonies which looked like onyxes.

[3] The Skýrsla (Report) of the Library gives a total of 387 works, distributed amongst eight stands of sixteen shelves—they are by no means well filled. Classical authors occupy two cases on the left of the entrance; on the right are translations of the Testament, and some elementary works in Arabic and Armenian, Hindostani,

above a broken globe, is a votive tablet erected to an English benefactor, Charles Kellsall of London, who supplied funds for the building, and who left it a library, which, they say, has not yet begun its journey Icelandwards: there is none to Mr John Heath, who printed the Rev. Jón Thorlaksson's well-known Eddaic paraphrase of "Paradise Lost," and to whom the Icelandic Literary Society owes a heavy debt of gratitude.

The principal library is in the Dómkirkja, under the charge of Hr Jón Árnason, inspector of the Latin School—in Iceland, as amongst Moslems, the church is considered the natural place for the library. You open the Lich-gate, ascend the right-hand staircase, and a second dwarf flight leads to the greniers under the roof. When the sun shines, the slates are too hot for the hand: this keeps the collection dry; and the reader is disposed to enjoy it.

The library opens on Wednesdays and Saturdays between twelve and one P.M., when you are allowed freely to borrow after signing your name. The interior is not prepossessing. The total of the volumes may be 14,000; but the catalogue is still to be made. Printed papers lie about in extreme confusion, and "vieux bouquins" are so strewed and piled that you can hardly find what you want. Many of the sets also are imperfect, having been lost or stolen. The three large deal stands, and the shelves ranged against the higher wall, do not supply accommodation enough, and the single writing-table is always desert. The curiously-carved black press from the west, and the pulpit with the four evangelists rudely cut upon it, are interesting, but should be transferred to the Antiquarian Museum.[1]

Maharati, and Bengali, all "dead letters" here. At the further end are modern books printed in Reykjavik. The small collection of Icelandic manuscripts is all on paper, the more valuable vellum has left the island for "foreign parts." There are bundles of ecclesiastical archives, tattered and unbound copies of the defunct "Islendingur," which is more quoted in England than in Iceland; and finally, there is a small set of novelists, Walter Scott (in German), Dickens, and Bulwer, lent to the reading public.

[1] The only remarkabilities are the Bibles and the manuscripts. Among the first we find the large folio Biblia of 1584—the first entire work—translated from the German version of Martin Luther by Guðbrand Thorlaksson, Bishop of Hólar, and there printed. This admirable work, which rivals our "established version," is not divided into verses, and is chiefly curious because the mechanical dignitary, who in 1574 imported new types, made his own capitals, plates, and woodcuts. He was assisted by the Icelander Jón Jónsson, and preceded by John Mathieson, a Swede, who brought the first printing press about 1520, and who published the

The manuscripts are a private collection belonging to the librarian, Hr Jón Árnason. They number 226, but not a few of them are copied from Sagas, and other works already printed; this is often done in Iceland, where time is cheap and books are dear. A comparison of the state of Icelandic with that of Persian literature would bring out a curious similarity, resulting from similar conditions, mental as well as physical; and it is the more interesting when we consider the intimate blood connection of the two families. Hr Jón Árnason wanted £200 for his neatly bound collection, and it has, I believe, been sold in London.[1]

The Antiquarian Museum, two rooms fronting north, is upon the same floor as the Library, under the charge of Hr Sigurðr

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"Breviarium Nidarosiense" in 1521; an ecclesiastical handbook, Luther's Catechism, and others of the same kind. These works, especially the Breviarium, are so rare as to be practically unprocurable. According to my informants, no "Elucidarius" has ever been published in Iceland. The Rev. Thorwaldr Bjarnason assured me that the oldest Icelandic manuscript is one of these catechisms, translated, as they all were, from Latin, and dating from the thirteenth century. The second Biblia (1644), after the Danish version of Bishop Resinius, is the work of Bishop Thorlak Skurlason of Hólar, who divided it into verses. The type is black letter, ultra-Gothic Gothic, and the two folios are in the best condition. There is a copy of the New Testament (1540, Henderson, ii. 265) translated by Oddr Gottskálksson, with the distinguishing mark ☩ (G. T. and cross), a large and thick duodecimo, with the beginning and the end restored by manuscript—Icelanders, as a rule, are very skilful in supplying lost pages. Of this book only three copies are known, the two others are at the deanery of Hruni and in Glasgow. Another New Testament (1609), reprinted at Hólar by Bishop Guðbrand, whose high-nosed and fork-bearded face remind us of his kinsman Rustam in far Iran, is a small stout octavo, with an old binding and metal clasps.

[1] The valuable printed books are the fourth volume of Finn Jónsson's "Historia Monastica," of which only three copies exist in the island; the "Scriptores Rerum Danicarum" (Jacobus Longebek, 8 vols. folio, Hafniæ, 1772); and the "Crymogea" of Arngrimr Jónsson, 4 vols. octavo: the latter is so unhappily divided that it is most difficult to find a passage required. Some of the shelves are filled with presents made by patriotic Icelanders and liberal publishers, such as *The Gentleman's Magazine* till 1771; a few Smithsonian and Patent Office Reports; "Le Plutarch Français;" "Conversations Lexicons;" the "Allgemeine Deutsch Bibliotek;" the "Bibliothèque des Romans;" "Chambers's Information for the People;" "Dictionnaire de Bayle," and the "Chronique des Religieux de Saint Denis," by L. Bellaguet—a curious mixture by the side of Thackeray, Dickens, and Marryat. The list of local works, so much wanted by travellers and so rarely found, is eminently defective. Neither the first nor the second volume of Cleasby was among the number, and although the Latin translation of the Njála exists, Mr Dasent's "Burnt Njál" did not appear. Of Englishmen in Iceland, I found Hooker and Mackenzie, Lord Dufferin, and Symington. Gaimard's sumptuous and expensive work, including the folio illustrations, is there: its fate has been general abuse and unlimited "cribbing." I was shown in London some photographs of exploration in the Vatnajökull, which were mere reproductions of the "Sommet du Snæfells Jökull;" and many a book of travels has similarly enriched itself.

Guðmundsson, who, like Hr Jón Árnason, is unsalaried. The former, smitten in youth by love of art, has given his life to painting, and to the study of Icelandic antiquities. The sketch and plans of the "Skáli," or ancient hall, and the plan of Thingvollur in "Burnt Njál," are productions of which he need not be ashamed. He usually makes the Hospital his studio; and he showed me some portraits which have the rare merit of representing the person, and not another person. Unhappily, it was his fate to lack the patron; a few years of youth spent like Thorwaldsen at Rome, where models are found, and where Nature inspires the brain, would have given warmth and life to a fancy frozen by the unartistic atmosphere of the far north.

The Collection, open at the same time as the Library, is in "apple-pie order," and, though young and small, it promises a goodly growth. There is a catalogue (Skýrsla um forngripasafn Íslands í Reykjavík, i. 1863-1866, published by the Icelandic Literary Society, and printed at Copenhagen, 157 pages, octavo), to which addenda should be appended; the specimens, as well as the cases, also require numbering, for easier reference. It is to be hoped that my excellent correspondents, the late Dr Cowie and Mr Petrie, have so arranged the collections at Lerwick and Kirkwall that the Shetlands and Orkneys may not blush in the presence of Iceland. I shall describe this museum at some length in a note at the end of this chapter: here we are amongst the past centuries, and older life in Iceland is prominently brought before our modern eyes.

Through the kindness of Hr Jón Árnason, I managed to "interview" the venerable Professor Björn Gunnlaugsson, who, being now eighty-four years old (born 1788), partly blind, and very deaf—his wife also an invalid—rarely opens to strangers. He is a fine old man, with large prominent features, shaven face, long hair, with small hands, here very unusual, and thin knees, rarer still. His portrait, taken in middle age, with two well-earned decorations upon the black dress-coat, shows an unusually sympathetic figure.

Welcoming us kindly, the Professor sat in his stuffed chair before a little table, and I noticed that he swayed his body to and fro like a Moslem boy reading the Koran. We talked of

his past life: he had forgotten the details, but he remembered the main points. After spending his youth in teaching mathematics and natural philosophy at the College, he resolved to map out his native island with theodolite, compass, and reflecting circle, and to this labour of love he conscientiously devoted twenty years, not twelve nor eighteen, as has been generally said. He was not very sure about his proceedings upon the Vatnajökullsvegr, the path north of the great south-eastern glacier, before his time considered utterly impracticable; and my curiosity was chiefly for this point. He mentioned his fellow-traveller, Síra Sigurðr Gunnarson, then a young man, who had just taken his degree. He believed that the march took place in July or August, but not after. Of the eight ponies, two were laden with hay, and they found grass at Tómasarhagi, north-west of the Vatnajökull. During his march, no volcano was observed, either in the glacier or to the north of it; and he seemed to have neglected tracing out the sulphur diggings.

When consulted about the Vatnajökullsvegr, Professor Gunnlaugsson strongly advised me to avoid it, as the animals would be exhausted before the real work of exploration began. The easiest attack upon the great glacier, he said, was from the north, especially when the polar winds were blowing, and thus travellers might penetrate to the centre without encountering the difficulties of the Klofajökull to the south. Altogether he was in favour of Berufjörð, the starting point. As the Danish steamer is bound, weather permitting, to touch at that port, I had thought when in England of making it my base; unhappily, the line was represented as too rugged for transit, in fact, impassable, whereas it is distinctly the reverse.

The Napoleon Book (p. 94) declares that Professor Gunnlaugsson began the wrong way by details instead of by an *ensemble* or general plan—a primitive style which would leave much of perfect topography to be desired. It forgets the preliminary trigonometrical labours of the Danish officers, detailed in the Introduction to these pages, and which left to Professor Gunnlaugsson only the task of filling in the already measured triangles. These meritorious men, as often happens, did the best part of the work, yet their names have well nigh sunk into

oblivion. But what can we expect when politics and party-spirit enter into science?

NOTE ON ANTIQUARIAN MUSEUM.

The room first entered is divided into two by a glass case, containing the toilette of the past century, when dress, worth some $300, was an heir-loom, and when costume was purely insular; not as now, a mixture of Icelandic, Danish, and cosmopolitan. The Museum of Science and Art at Edinburgh contains some articles presented by the gentleman to whom these pages are inscribed; and M. de Kerguelen (1772) sketches a "lady of Iceland" intelligible only when the several items are seen. The case is surmounted by a rude portrait, with Latin verses, in honour of a certain Frú[1] Hólmfríðr: her hair is concealed by a white koffur or fillet wrapper, somewhat like that worn by the married German Jewess at the four holy cities of Palestine, and this is surmounted by the Hæltve, or travelling hat. The steeple-crowned broad-flapped felt is precisely the Pétasus of the old Greeks, and probably came to Iceland with the pilgrims of the Middle Ages. For the house there are skull caps in plenty, mostly black velvet and gold embroidered; some of them have flaps like the "Kan-top" of Hindostan, others show the rudi-

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[1] The oldest form is Frauva, and the later Frú is probably a contracted form of Fruvu, or of Freyja (Venus), according to the Prose Edda (c. 24), but in the glossary to the Poetical Edda, it is from Friðr, handsome, whence Friðla, a concubine, corresponding with the German Frau, but put after as well as before the name. It was little used before the thirteenth century, and in the fourteenth it was applied to abbesses and the wives of knights, not of priests. At present, it is given without distinction. Húsfreyja is = Germ. Hausfrau = Eng. Housewife, always a married woman. Junfrú is = Germ. Jungfrau, a princess in the thirteenth century, now simply Mademoiselle. Víf (Weib, a wife) is purely poetical in Icel.; it is supposed to be originally a weaver (Vefa, vífiðr). Hence the Anglo-Saxon Wîfmann = woman, not womb- (Icel. Vömb) man. Herra (= Germ. Herr) was a title given in A.D. 1277 to the new Norwegian creation of barons (Hersar) and knights: bishops and abbots were also so styled. After the Reformation it became an integral part of the address of bishops, as Síra of priests, but only applied like the Latin Don (dominus) to Christian names. Now it is our Mister or Esquire in writing: in conversation Icelanders have no equivalent for these words; the person, if not a clerk, is simply addressed by his Christian name. The old scale of precedence was Konungr, Jarl, Hersir (the baron of Normandy and Norman England), Höldr (yeoman), and Búandi or Bóndi, = Germ. Bauer, a tiller of the ground (Cleasby).

mental crest which culminated in the Skaut-faldr.[1] This fools-cap, built with a card-board frame, is then covered with linen; a thin plate of metal forms the crest shape, and the white material is stuffed with cotton, like the Húfa (pronounced *Húa*,= our hood). It is fastened to the hair by pins; and an outer band, spangled with a dozen silver-gilt stars, secures it round the brow, ending behind in a cravat bow and two ribbons, which hide the fastening. Finally, a deep fall or lace veil is turned back, passed over it, and thrown upon the shoulders, reaching almost to the waist. This Skaut-faldr is an excrescence, which deserves to be compared with the Tantúr, or silver horn of the Libanus, which was and is generally confined to married, though sometimes worn by marriageable women.

The other articles of dress are the Skirta (shift) of woollen stuff, worn next to the body: according to some authorities, the health of the people has been improved by cotton, which others deny. The Upphlutur is the long-sleeved bodice, or waist piece, with gold embroidered cuffs, and velvet stripes covering the seams. In modern days it is of velvet, brought from Europe. The Fat is a Wadmal petticoat, extending to the ankles, and of these articles sometimes two or three were worn for warmth. The outer one is copiously worked, and is faced by the coloured Svinta (apron). The Treja is a tight-fitting jacket, with chased buttons: the Hempa, a short outer coat, worn by men and women, buttoned over the chest, is wide at the bottom, about a hand's breadth shorter than the skirt, and open at the flaps to show the embroidered petticoat. The Uppslög or cuffs are slashed; round the neck is a Hálsklútr (white cravat), a Háls-sikener, or cravat of purple silk; and for full dress Strútr, little black collars on the jacket neck, and Kragar, stiff hoops or ruffs of black embroidered stuff, which make the head look as if it were dished up. The terminations are Sokkar, coarse woollen stockings, and Skór, the Iceland papushes: finally,

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[1] From Falda, to fold, hence the Ital. Falda and Faldetta, head-dress. As women vied in the size of this "stately national head-gear," it obtained the sarcastic name Stiku-faldr, "yard-long fald." In modern poetry, Iceland, with her glaciers, is represented as a woman with her fald on. Skaut is the "sheet" or veil, which hung down behind (Cleasby).

Kvenn vetlingar, rough gloves, protected the hands. The trimmings of the gowns, skirts, and petticoats are very handsome; nothing of the kind can be found in the present day; and the people have the lost art of cutting wool so as to resemble velvet-pile. The black dye is admirable; it is a fast colour, and lasts exceptionally long. According to the Custodian, it was made by steeping the cloth in dark mud, and then treating it with the juice of the arbutus (*Uva ursi*, Surtarlýng), our bear-berry and the cane-apple of Ireland. The modern toilette has been greatly simplified to the Skaut-faldr and bodice, the skirt of black broadcloth and velvet, embroidered with green silk, and the waist-belt, a poor filigree copy of old work. It costs £17 to £18, and might answer for a civilised fancy ball: the general aspect is that of a Circassian woman's dress—in Circassia.

The ornaments, belts, buttons, bodices, chains, and rings, mostly heir-looms, are as numerous as the articles of dress: they are survivals of the time when people wore all their wealth. Some of the Hnappar (buttons), round and of worked surface, have one or more figures of the Crucifixion hanging to them. These are no longer made. There are Ermahnappr, silver-gilt buttons, for the sleeves,[1] and much larger, with clasps, for the waist; bodkins (Laufa priónar), ornamented with silver; Keðja, chains of sorts; Hálsfesti for the neck, and Herðafesti for the shoulder; rings of gold, silver and brass, one of them spiral and elastic; Nisti (bracelets), and Mallinda, velvet girdles, embroidered with silver. Some of the belts are plates of gold and silver, linked together, and hanging down in front almost to the knees. There is an immense demand for these curios: every stranger carries off some specimens of the old work, with which the owners are compelled by necessity to part: the country people would be buyers, not sellers. Modern imitations are made without any success at Reykjavik, but not elsewhere. You give German dollars to Páll Eyúlfsson, or to Hr Sigfusson, if the latter is sober, and they convert them into filigree work, which does not contrast well with the neat, plain jewellery of Norway, now becoming known in England. Needless in these days to warn

[1] Forbes' sketch of "Helda's buttons" gives an excellent idea of the article.

strangers against counterfeits, the "Iceland snuff-boxes" of walrus tooth are mostly made in Germany.

Near the door is a quaint bird's-eye sketch, dating from 1770, brought from the Borgafjörð Sýsla, and illustrating the dress of the time at a Bær,[1] or farm-house. In front of the buildings, which are all out of perspective, as if the painter had Chinese eyes obliquely set, stand groups of men and women, walking, riding, and working. The former have knee-breeches, and one of them not a little resembles in suit the portraits of Doctor Johnson. There are two sawyers, and others ply the iron-shod wooden spade, of which a specimen hangs in the room. The women, raking hay, or pumping, drawing, and carrying water in pails, bear the Skaut-faldr, now confined to Sundays and festivals. Another portrait of a woman (1772) wears a foulard round the head, instead of the skull cap or foolscap. A curious pencil sketch, probably copied from the original in the Skarð church, Breiðafjörð, shows Daði Bjarnarson (ob. æt. 68, A.D. 1643) and his wife Arnfrydur, both kneeling with cuffed hands: he wears a Skegg (beard), in cut and shape most like a tile, huge trunk hose, tight stockings, and shoes with big rosettes.

The same room contains a variety of domestic implements, especially worked tapestry: in another part specimens of large-meshed white lace are preserved. There is a bed, dating from 1740, box-shaped, but not so much as the modern: on the outer side the occupant and the clothes are guarded by rudely carved Rúm fjöl (bed foils) or planks, five feet long, still used here and at the Færoes. Being carpentered into the chamber-walls, the other side requires no such protection. Curtains shelter it from the cold: there are coverlets and a night-cap, in those days often used as a day-cap; and the outer corners are supplied with rude human figures. The mannikin at the tester holds a kind of candlestick, evidently to facilitate the practice, pleasant but wrong, of reading in bed. Upon the top of a press stands a lantern, with scanty glass, and woodwork rising flamboyant, or

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[1] M. Gaimard deduces this word from the Germ. Bauer, peasant; evidently an error. The North of England names, of which twenty to thirty end in *-by*, *e.g.*, Kirk-by, derived the suffix from the Danish and Swedish *-by*, which is = Icel. Bær (Cleasby).

rather like green sausages, above it. All the rooms contain upright planks, grotesquely carved: these are lineal descents from the consecrated high seats of the heathenry, and in more modern times they were ranged round the hall, with hangings between. One of them shows a mermaid with pendent bosom and child; of course, *desinit in piscem.* The single chair has a tall carved back, and inside the two doors are sets of ornamental iron work. The quaint-shaped knockers are purely Roman—they are still dug up in Syria.

The weapons, which date from A.D. 1050 to 1400, are represented by old spears and halberts. A good imitation Toledo blade, with sunk midrib; daggers and battle-axes, one of which was taken from under a heap of stones in the Vestmannaeyjar; chain armour, and a variety of large and small Bigones (hones), of smooth compact basalt, for cleaning and sharpening weapons. A saddle cloth, hanging against the wall, shows figures of various animals, tolerable tambour work, in the Persian style. There is a collection of iron, wooden, and bone stirrups, and sundry prick-spurs. The cups are interesting; and one of them, probably intended for a man and his wife, contains at least a quart bottle. The finest are made of walrus teeth (Rostungr, *Trichecus rosmarus*), the animal being often cast ashore in the north: poorer specimens are of horn. Here we find the material for the Guma Minni, or memorial bowls; the Guðfödurs Minni, or cup quaffed to God the Father; the Heilags Anda Minni, to the Holy Ghost; the toast to the Archangel Michael, a fighter like old Thor; the Mariu Minni, of the Blessed Virgin; and the Marteinn's Minni, to Martin (Turonensis). The snuff-boxes are unlike the horns now used: one is an oval, with an upper plate of ivory and wood below, hooped round with brass, and containing a cullender, probably used for pulverising the leaf. Mangling seems to have been a favourite occupation; the hand articles (Kefli) are found in numbers: the roller is smooth; the upper stick is carved, and gaudily painted;[1] and the *étuis* are as numerous

[1] The instrument occurs in the proverb, "Svá eru Flosa ráð sem fari Kefli." Flosa plans are a rolling cylinder (Gr. Οἱ δὲ κυλίνδροις ἄλλοτ' ἐπ' ἀλλὰ φέρονται), the metaphor being taken from a mangle (Cleasby).

as the mangles. One case containing bobbins is fastened to an embroidery cushion; another bears date 1677. Some hold horn spoons, others razors, others buttons, and all are shaped like the inkstands of the East, and curiously but artlessly carved. There is a coarse plane for the carpenter. The weaver of rude cloth worked his sword-shaped shuttle of polished bone, yielded by the whale, whose ribs also supplied rafters, more expensive but more durable than wood. The mammal gave material for dice and draughtsmen played at Kotra (tables), and these are the nearest approaches to the "chessmen made of fish bones," mentioned in old books. There is a specimen of the Langspiel (violin), and its horsehair bow, formerly so well known in the Scoto-Scandinavian islands.[1] This instrument has three pegs for strings, and seventeen frets, but no bridge: possibly it was played with the thumb, as the Barber of Seville is still wont to do. Uno Von Troil supplies it (p. 92) with six brass wires, acting strings; but I do not understand what his "symphon" is. Mackenzie sketches it, but shows the side instead of the face; and Hooker, drawing it from memory, draws it incorrectly.

The spoils of the Old Church are not numerous: they consist of two altar-cloths embroidered in colours; the altar stone from the Skálholt Cathedral, white marble, blackened above by use; an antique monstrance with a Latin inscription; and some fine enamelled and jewelled crucifixes, said to date from A.D. 1300: many of the stones have been picked out, but the eyes remain. There is also a rudely carved salmon, supposed to have been an *ex voto*.

In the same room stand two cases (unnumbered) containing finds from a grave opened at Baldursheim in the north, and supposed to date before the Christian era (A.D. 1000). Besides a few bits of rusty iron, serving for different purposes, it has a calvaria without front teeth, and with a large occipital projection like a woman's. A third case, also from the same place, shows fragments of another calvaria, a large jaw and other bones, a small tooth-comb, and sundries. A fourth has horse-bits of

[1] The latter also has introduced the rude Scotch Posh or fiddle, strung with "Torren," the small gut of the sheep (Edmonston).

bronze and rust-eaten iron, shaped like the modern, and huge spurs with and without rowels, now unknown in the island except to foreigners. A fifth and a sixth preserve fine old filigree buttons and gold brooches, larger than crown pieces, used as fibulæ for the breast and shoulders: they are said to be pre-Christian; and the Edda (Völundarkviða, 24) alludes to a curious ornamentation:

> "But of the teeth
> Of the two (children),
> He (Völundr, or Wayland Smith[1]) breast ornaments made."

And even in modern days maternal affection sometimes mounts a sucking-tooth in a ring. The necklace beads are very interesting; some are of jade, others of crystal, and others of amber. There is a long blue bugle, not unlike the Popo bead of West Africa, and the specimen which Mr Rattray found at Sáhib el Zamán (Cælesyria), and presented to the Anthropological Institute. Others are irregular tubes with green, red, and white upon black ground; the forms, and even the decorations, may be found everywhere, from the British Islands to the Arabian Desert. It is hard to say whence these articles came to Iceland, beads are indestructible as gums and cowries: of all ornaments they seem to have travelled farthest.

There are also two presses containing antiquities, presented by Mr Henderson, son of the well-known Icelandic traveller; the Lord's Prayer in old characters, ancient annotations of music, and a document with the signature of the martyr (?) Jón Arason, "Biskup à Hólum." The seal, printed on red wax, bore a crucifix with the bishop standing to the left: on the right was a mitre and a shield charged with a lily.

The most interesting parts of the collection to me were what have been contemptuously called in Scotland "chuckie stanes."

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[1] Thorpe (Edda, preface, part ii., pp. iv., v.) suggests that the name of this adaptation of Vedic and Iranic artificer-gods, this northern Vulcan and Dædalus, may be merely an adaptation from the German Wieland, or the Anglo-Saxon Weland, and notices Sir Walter Scott's woeful perversion, in "Kenilworth," of the venerable legend travestied from the Berkshire tradition. Blackwall tells us that a labyrinth was called Völundarhús—a wayland house; and Cleasby that Völundr survives in the Fr. Galant, and the Eng. Gallant.

Strictly speaking, no pre-historic remains exist in Iceland: perhaps it is safer to say that none have yet been found. At present we must believe, despite the synecdoche of "Ultima Thule," that the island, when colonised by the Irish monks, was a desert, and we must continue to hold this opinion until Mongoloid skulls or other remains shall have been discovered. The neolithic-stone age still endures in Iceland, as it does in the Brazil, not to mention other countries. Here almost every cottage, in places where iron is wanting, has a stone-hammer for pounding fish: it is a rounded ball of porous basalt about four inches in diameter, and bored through to admit a wooden handle. The general use of the article may convince students that the pierced celts and stone axes which, on account of easy fracture, were held to have been intended for worship or display, and, perhaps, for reproducing copper or bronze forms, might have been used for battle if not for work.

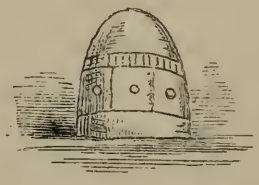
The stone articles in Iceland seem to be imitated from those of the outer world; and the similarity of type, extending from England to Australia, has not a little astonished anthropologists:[1] "Tant il est vrai," says Sig. Visconti, "que l'esprit de l'homme, malgré la différénce des siècles et des climats, est disposé à agir de la même manière dans des circonstances pareilles, sans avoir besoin ni de tradition ni d'exemple." Hence the New Zealanders, as well as the old Icelanders, gave names to their ancestral canoes, their paddles, and their weapons. The steatite bowls might be from Minas Geraes: the material, according to the people, was supplied by the southern islands. On the other hand, Mackenzie (chap. ix.) found about Drápuhlíð, "a yellowish white substance, having a smooth, shining fracture; it may be cut with a knife, and appears to be steatite." He also mentions (p. 428) friable, white and reddish-brown steatite, near the hot springs of Reykjavik. A truncated, tetragonal pillar of bluish soap-stone, with a square cornice and a shallow cup ending in a cylinder pierced right through, is somewhat mysterious:

[1] The day, however, has not come when these weapons can be ranged strictly according to date, and when a narrow comparison of differences, not of superficial resemblance, can be made between those discovered in different parts of the world.

possibly it was used, and so local tradition asserts, as a portable font.

The basaltic specimens are: 1. Weaver's weight bored for stringing; 2. Sinker for fish-net, with deep groove round the longer waist of the oval; 3. Weight, dating from 1693, shaped like a conical cannon-ball, and adorned with bands and bosses; 4. Circular quern-stone with hole through it; 5. Cone, with flat base, used to grind colours; 6. Rude ladle with broken handle; 7. Pierced stones for spindles, resembling the African; 8. Various hones, before alluded to; 9. Prismatic column with runes, taken from a tomb; and, lastly, what seems to have been a club or axe. Though made of the hardest and closest basalt, with broad ribs whose angles are now rounded, the specimen is imperfect: the handle, one foot one inch long, is partly broken away, and the head, four inches broad, lacks the edged part. Still it is the most valuable of the "ceraunei lapides."

THE BASALT HAMMER.



THE STONE WEIGHT.

The east room has a large central stand of four compartments. We especially remark: 1. The seals of ivory and bone. 2. An iron châtelaine to which hung a knife, a skewer, and a key, not unlike those we use for watches, but with the handle more rounded: it is inscribed I. H. S. 3. A diminutive "Hammer of Thor,"[1] with a magical character on the head which discovered thieves: the only other "Miölner" on the island

[1] It is nothing but the "cross cramponné" of heraldry, and is generally identified with the mythic "thunderbolt;" hence, probably, the pre-Christian crosses of Scandinavian inscriptions. Of the sacred cross in the Huaca at Cuzco, we learn that the Incas did not worship it, beyond holding it in veneration on account of the beauty of its form, or for some other reason which they could scarcely give expression to (Garcilasso de la Vega, translated, etc., by Clements R. Markham, C.B., for the Hakluyt Society, London, 1869). It may be remarked that the pre-Christian cross, shaped as an ordinary Greek cross, when not connected with the sacred Tau of Egypt, was the symbol of the four quarters; when sur-

belongs to a widow at Hofsós. 4. Buttons of horsehair from the mane and tail; they were still used by the Færoese in 1810. 5. Two specimens of the Lausnarsteinn, a flat, hard seed two or three inches in diameter, which here, as in Cornwall, was supposed, when drunk in infusion, to facilitate parturition: the superstition vanished when it was found to be not a magic bean but only a horse-chestnut thrown ashore, like the *Dolichos urens* and the *Entada gigalobium*, by the currents. 6. Onyxes and agates, called Nachturn-steinn (nature stones), which, being banded, were held to be charms, and prevented the owner losing his cattle, whilst the Oska-steinn (asking-stone) gave him all he wished. 7. A fine Christ, evidently from a crucifix; the blood is enamelled, and the work appears to be Byzantine.

Two cases to the east contain a few early types cut in wood, and one of them is devoted to those of Hreppsey. Only one letter of 1488 remains, and there are a few capitals used by Bishop Guðbrand at Nupúfell in Eyjafjörð. The drawers beneath protect old manuscripts written with decoction of willow-bark, or with the arbutus-juice which served as cloth-dye: the colour is well preserved. A glass box hanging to the western wall contains German coins, pottery, quaintly rounded silver spurs, and Bishop Guðbrand's drinking-cup. Another and a similar case shows the only procession flag in the island; it is of faded pink silk, almost colourless, with a white linen cross and an edging of three lappets fringed with green and gold. There are also narrow webs for weaving ornamental cords.

Over the western doorway hangs an old lace bed-curtain, white, and well made. Scattered about the room are various articles—viz.: 1. A wooden plank with an epitaph dated 1755, and quite in the style of the "lying tombstone;" 2. Carved doorposts for the church or the house; 3. A large wooden chair, the arms ending in carved knights, whose horses are those of our

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rounded by a circle, it denoted the solar path from left to right round the world. A later symbol of the same order was the Hindu *Swastika* (mystical mark, meeting of four roads, etc.), whose arms, according to Mr Beal, should always be drawn from left to right, and not, as is sometimes done, "widdershins," or in the reverse way. Finally, the crocheted cross (Cruz ansata at four ends) is the Aryan symbol of the sacred fire lit by Pramatha (Prometheus).

chessmen; and 4. A beam, ten feet long, pierced with thirty-two holes—with such an instrument Penelope might have woven her web. There is also a specimen of the old Flekí, two or three boards thirty-two inches long by twenty-eight; it was drilled with holes pierced for snares of twisted horsehair, and anchored off some skerry with ropes, and stones or horse-bones. A decoy bird upon each instrument was useful to catch guillemots.

CHAPTER VII.

TOURISTS AND TOURS—GUIDES AND HORSES—HORSE GEAR, TRAPS, AND TENTS.

PRESENTLY the steamers left Reykjavik, and the torpid little community hybernated once more: it will awake and buzz for a while when the next mail comes. In the meantime—

> "The skies they are ashen and sober,
> The streets they are dirty and drear."

The weather makes the faintest struggles, even in mid-June, to be fine, but a tolerable day appears always to exhaust its efforts, and to be followed by a violent break. The Reykjavik climate is essentially fickle, and the invalid can rarely neglect, till late summer, the warm overcoat of which the cicerone at St Petersburgh persistently reminds his charges. A bitter north-easter, with high cirri, and

> "The shrieking of the mindless wind,"

remind us that we are in high latitudes. All the thoroughfares are deserted, and the houses are fast closed against the roaring, screaming blast.

We were the first batch of the year's tourists, arriving, however, only one day before the "Diana," which brought with it sundry others. Whilst I remained at the capital to continue my studies, Messrs B. and S. determined to "do" the usual trip as soon as possible. A five days' delay, without books or some definite object, makes the headquarter village a purgatory to strangers. Most of them bring out an Eton Latin grammar, under the impression that, by its good aid, with a course of Matthæus Corderius, they will make themselves at home

amongst the learned. But the English pronunciation is impossible, and too often a total neglect of the "literæ humaniores," persistently distributed over long years, has swept away all memory of *musa, musæ,* and of *hic, hæc, hoc.* Consequently, second-hand Anglo-Latin grammars are cheap and plentiful at Reykjavik.

Those who would save time in travelling can hardly expect to spare their expenditure. My companions wisely called in the head guide, Geir Zoega, pronounced *Sögha,* and frequently simplified by the Briton to "Goat-sucker." The classical Italian name (De Origine et Usu Obeliscorum, etc.) shows his origin, but the family has drifted through Germany, and, as his grandfather settled in Iceland, he has wholly thrown off the Latin aspect. A tall, robust man, with harsh Scotch features, high cheek bones, yellow hair, and blue eyes, in earlier days he would have been most useful to explorers; now, however, he has waxed rich: he is farmer and fisherman, cattle-breeder and capitalist, boasting of house, boats, beasts, and other symptoms of wealth. These may represent a capital between £500 and £700, and almost unincumbered by expenses—a century and a half ago the same fortune would fully have contented a master-cutler at Sheffield. Consequently, Geir Zoega will only engage for short trips, and, despite rumours of $15,000, he refused to accompany the two young "Counts d'Elbe," who came with the intention of spending some six weeks in the interior. Having business of his own in the east, he undertakes the tourists as far as the Geysirs, but he positively refuses Hekla, forage being still wanting there. During the bargain he amused me by certain points of resemblance with the Syrian dragoman taking command of a party of youngsters: the same covered and respectful contempt of greenhorns, the same intense objection to innovation, the same unwillingness of experience to be guided by "bumptious" inexperience, contrast curiously with the pliability of the Italian courier or cicerone, who thinks only of his bill.

Finally, Hr Zoega agreed to supply a tent, absolutely necessary for the Geysirs, a change of horses for each rider, and three baggage animals, *moyennant* a total of $14 per diem—his own fee being a daily $5. Moreover, the travellers were to feed their

nine beasts at the rate of a mark each per march. This confirms Mr Newton's opinion that, on the whole, travelling in Iceland is not more expensive—perhaps he might have said much cheaper—than in most parts of Europe.[1] Yet we find Professor Melsted, an Icelander, describing his native land to Metcalfe as "the most difficult and expensive country in the world." During one day on the Congo, I have been asked, for simple permission to pass onwards, three times more than the cost of a three months' tour in Iceland.

Mr S. being a barrister, drew out a written agreement, which the guide signed: the precaution, however, is of little value, as the stranger is completely in the native's power, and a threat to drive away the horses will bring the most recalcitrant Griff to absolute submission. If you turn off your leader, as a certain traveller did, he will assuredly sue you in damages at Reykjavik; and for one who cannot speak Icelandic, or at least Danish, to be guideless is to be cast naked upon a desert shore. It is only fair to say that Hr Zoega gave ample satisfaction, and we only regret the more that the deceitfulness of riches has spoiled a thoroughly honest and intelligent guide.

My companions found no difficulty in starting: the dilatory Icelandic movement, of which old travellers complain so loudly, is now a thing of the past. The weather improved, as usual, after they left Reykjavik, and there were only a few showers to gladden the peasant's heart. The birds were hatching, so they did not shoot: the water, cold, and clear as crystal, wanted vegetation, without which even gold-fish cannot live, consequently there was no fishing. There had been scanty reason to complain of what the Brazilians call "immundicies"—the smaller animal creation—but a Neapolitan might have recited every morning the popular song

"Quando mi cocco a letto," etc., etc.

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[1] The trip of eight days thus costs £14, but the travellers had potted provisions, liquor, and other comforts, which may have brought the expense up to £20—£10 each. Allowing £3 for the six days of delay, in or about Reykjavik, till the fortnightly steamer starts; £6 for coming from and returning to Granton; and £3 for extras; the total of £22 easily "does" the Geysirs. Of course, those who are not hurried will pay much less.

They lamented only one thing, not having taken a pack of cards, or a cribbage board, to while away the long, slow hours of halt.

The next that effected his escape was a young painter, who came out for the purpose of sketching Iceland scenery, and who wisely chose the seldom-visited south coast. Thus he was able to imitate the *Conte di Haga, che molto vede e poco paga;* and all his expenses during forty-two days were limited to a couple of florins per diem. He resolved to buy ponies, and laid out £17, 10s. upon three, expecting after return to sell them for two-thirds of the outlay, whereas the usual hire would have absorbed $126. And he was successful. But travelling in this way becomes exceedingly slow, as the animals must be the first consideration, if at least they are to fetch anything like cost price at the end of the journey. He secured a guide, of whom more presently: the fellow at once became painfully familiar, "independent" would be the polite word, and stuck to his victim like a leech.

Captain J. and Dr S. of the Indian Army allowed themselves six weeks for a sporting tour, which was a dead failure. Unfortunately they fell into bad hands. Metcalfe advises the traveller to engage some student by way of interpreter; and I found it a good plan in the eastern country. Moreover, even at Reykjavik, good guides are procurable. But they lent a willing ear to a certain Helgi Magnússon of the Latin School, half-brother to an Icelander, who, after two years' study at the Latin School of Reykjavik, went to England for the purpose of translating Icelandic documents, and managed, no one knows how, a good appointment at Cambridge. People here inquire if the great English university is so destitute of talent that it must come to Iceland. In reply, I can only plead British eccentricity; the same curious policy which made the late Colonel Sykes advocate the employment of the brothers Schlagintweit, when a dozen Anglo-Indian officers were as well fitted for, as they were ambitious of, being so employed. The following is Hr Helgi's *signalement:* tall, spare, blond, and clean shaven, except the long mustachio, which is in the habit of being pulled. He claimed to know English, meaning he was able to pronounce articulately a few sentences; the answer, however, was an idiotic stare, and

an ejaculated "No," invariably introduced. He began by finding fault with everything, and by telling his employers that they must cook, make beds, groom, saddle, and unsaddle for themselves. Presently he scented English provisions—feeding amongst these people is all-important as to the Bedawín—and the discovery greatly modified his tone. They did not, however, come to terms; and he amused himself by doing all he could to hinder the tourists. The same worthy called upon us, proposing an exchange of sovereigns, not for our benefit, a form of annoyance recognised by previous travellers; he also brought a cow's horn, very badly cut, for which he modestly asked a pound sterling.

After maundering about for several days in despair, the travellers

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engaged one Haldór Johannsen, a saddler, and certainly one of the ugliest saddlers in the world. He began by objecting to the English ropes, of which they had brought a store, and he could

not travel without Iceland gear, which stands about as much work as twisted straw. He proved himself a perfect Mark Tapley on the road; but, on his return from the first trip, he so abandoned himself to the cultus of Bacchus that he could not be re-employed. This party lost time and money in purchasing nags, at first they were asked £10 for animals worth at most £4. They bought, after weary bargaining, three animals, for £7, £8, and £9, and the consequence was that two out of three came to grief. They also brought out a very extensive "kit," which they flattered themselves would readily sell after return to Reykjavik —it fetched the liberal sum popularly called "half nothing." They made two trips, one to Hekla viâ Krísuvík, and the other to Surts-hellir, praised the fishing, and found the shooting a farce.

As will be gathered from the following pages, the Icelandic Fylgimaðr ("fugleman" or guide) is still in a rudimentary stage. He is apt either to lag behind like the African, or to gallop ahead like the Gaucho of the Pampas, utterly reckless of his charge. He is sure not to be cunning in those details of country which save so much time and which, ignored, so often lead to grief. As a rule, old paths have been broken up by weather, and only those on the spot can know the later lines: when, therefore, you see the least doubt, engage a temporary assistant for a few marks, which are not wasted. He has one great merit: his language is not foul, and he does not "exhort the impenitent quadruped" with the emphasis of his brother bipeds elsewhere; he believes that swearing will cause his tongue to become black-spotted. In point of conservatism he is a Hindu; wain-ropes will not move him from settled "use and custom." Those I found of most account were Páll Eyúlfsson, Sigurð Jonasson, who accompanied Lord Dufferin; Einar Símonsson, and Bjarni Stefansson, the two latter speaking a little English.

And now to add a few remarks about Iceland ponies,[1] concerning which gross exaggeration prevails: one traveller, who is generally remarkable for sobriety, would ride them "over the ruins of Westminster Abbey." The origin of the horse, as of the

[1] The figures have been treated in the Introduction, Sect. VII.

man, is Norwegian; these "norbaggers" reminded me of the little hay-fed nags of the Continent, and of Wrangell's Siberian travel. In Scandinavia, however, breeding has done something, here nothing. No signs of an indigenous horse, like the zebra-shaped Hipparion of Europe, Asia, and America, have yet come to light, but the old bones dug up in several parts of the island show a much larger animal. The "troops of wild Icelandic horses, which shift for themselves even in the severest winters, when they perish in large numbers," is a traveller's dream, like tales of wild camels. Traces of the pony breed are found in Ireland and the Scoto-Scandinavian archipelago, not to mention New Forest; the Asturiones, or small mountain-ponies, which were so called, says Sir James Ware, because imported from the Spanish Asturias, waxed scarce during the end of the last century, and now they are well nigh extinct. The sheltie of Hjaltland has been wrongly derived from Iberian blood: it is also becoming rare, and, curious to say, though enjoying a much milder climate, and a comparatively plentiful forage, it is more stunted and of lighter build than those in the more barren north. The Orkney "garron" was an admirable animal, and, *pur sang*, like the old Norman, which I have seen in the "haras" of Abbeville, fine-limbed and high-spirited as an Arab. The common "garron," a mixed breed, was short and ugly, but an excellent roadster, like the Tartar Yábú, which we have allowed to become obsolete in India: ten years ago it fetched £5; the race has been ruined by breeding for size, the sires being big hammer-headed stallions from Aberdeen. The Færoese, unlike the Icelanders, have sold off all their best animals, and it is hardly fair to judge from the refuse. I would back against any Icelander, a New Forest pony or a Maharatta "tattoo;" and my Kurdish Rahwán at Damascus would have knocked the wind out of any in the island.

It has been shown that the total of horses in 1871 was only 3164 over the number assigned to 1804. The reason is not hippophagy, which is almost unknown, but which might have been practised with advantage save for an obsolete superstition: as a rule, also, those classes are most particular about their diet who can the least afford it; and the obsolete Mosaic Code, so well

adapted to its day and latitude, has not yet been exchanged for the sensible omnivorous system of China. Thus, it is now said, while horses are eaten in France, they eat us up in England. The three commandments issued by Christianity to her proselytes were, "Marry only one wife, expose not your children, and feed not on horse-flesh." These were accepted by all parts except the southern coast, where hippic meat, like the Giftessen (arsenic-eating) of mountainous Styria, ensured a good complexion; and it is well known that in the Far West men prefer "three-year-old mustang" to bison or common beef. But Hrosseitr became a word of reproach, and Iceland gave up what was supposed to be unhallowed flesh offered to idols; the horse being, as in the Aswamedha of the old Hindus, a great and ceremonious sacrifice. The Devil always "scratches his writing on a blighted horse's bone;" the heathen swore by the "shoulder of a horse and the edge of a sword;" and the horse's head formed a "nithing-post" of peculiar efficacy. The truth is, that the Icelander wants every blade of grass and hay for his cows and sheep; he, therefore, either "traded off" his colts, or cut their throats and sold their skins. Under the influence of a ready market, breeding will again be resumed.

The export was caused by the rise of prices elsewhere; the New Forest nag advanced, for instance, from £5 to £12. But the Icelander has had the sense to part with inferior animals, jades fit only for the knacker and the kennel. He has a curious idea that ponies used in the English mines are first blinded, like decoy singing-birds upon the shores of the Mediterranean.

In 1770 the horse fetched $3 (rixdollars, say half-crowns). During the early part of the present century Mackenzie and others paid $6 where we now disburse pounds sterling. In 1862 a picked animal sold from $12; this price, in 1864, rose, as has been shown, to £5, 5s. a head. The Consular Report of 1870-71 says, "The price for a good horse averages at present from £2 to £4." During my visit, the mean sums paid by the steamers were £3 to £4. Baggage ponies for travellers commanded £5 to £6, and good riding-nags £7 to £9. Perhaps no article in Iceland has run up so rapidly as horse-flesh, and the resident feels it as well as the traveller. This, however, is, as I have

shown, probably a provisional grievance; and, despite the inconvenience, the trade is perfectly legitimate. Happily for Iceland, no class corresponds with our small fund-holder, who is in a fair way of finding life in England impossible, and who must disperse, like the large British colony of small rentiers in Paris, when income became stationary and outlay became imperial.

Henderson (i. 19) and other travellers make the "Hross"[1] average from 13 to 14 hands. If this be true they have fallen off since the beginning of the century, which is improbable as the degeneracy of peaches recorded in "Gil Blas." Baring-Gould says 14. I should lay down a high average between 12 and 13: out of a number which were measured the shortest was 10·3; and only one in a dozen barely reached 13. The curious fact that the climate least fitted for the horse, and the land where it fares worst, produces larger and stronger animals than the southern islands, can be explained only by the superior size of those first introduced. After a time the eye becomes accustomed to the stunted stature, at least when not contrasted with a tall rider. The best specimens are shaped somewhat like the Suffolk "punch," with big barrels, thick necks, and short, stout legs. They have round noses of the Norman type, bearded chins, well-opened eyes, ears short and pretty, erect manes, and the square box-head which appears in the classical horse of medals and statuary. The strong points of the fubsy little animals are the manes and tails; the former even when hogged conceal the crest like a lion's *crinière*, and if not cut would hang to the knees; the latter would be ornamental but for the local fashion of thinning them at the roots, and of tying up wisps of hair in small knots.

The horse in Iceland is an inevitable evil, the climate being too cold to breed mules. The beasts show many signs of falling off besides size, and we should wonder if it were otherwise. Stallions are allowed freely to run with the mares; and the

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[1] Hross in Icelandic (Germ. Ross, Fr. Rosse) is singular and plural. So Chaucer makes "hors" plural, and we still say, a troop of horse, like a flock of sheep. So in Shetland Russa-bairn (stallion, male) is opposed to Hesta-bairn (mare) child. The Hengist and Horsa of our innocent childhood were derived from the same words.

evil of inbreeding is exaggerated by the small number—sometimes a parish will not have more than one. In the classical days of Iceland men rode entire horses, and a favourite festal pastime was a fight: the Hesta-thing ("horse meeting") suggests the champion camels which bite each other at Smyrna. It seems to have been a brutal custom, as the animals had to be flogged, like the older sort of Chinaman soldier, to the fray; what a contrast with the Indian "man-eater," which safely faces a tiger! The Sagas also mention racing as a popular amusement: this, also, is apparently obsolete, at least I never saw it. Stallions are now considered too fierce for general use, and yet, like all the animals in the country, they will be found exceptionally free from vice: mares also are rarely ridden, and the people tell you that they are incapable of hard work, of course, an utter prejudice; in fact, geldings, as with us, are the rule. The Arab, it is well known, mounts the mare because she has more endurance and is less given to neighing at times when surprises are intended: the Spaniard preferred stallions, and to show his contempt for the Ishmaelite, put the jester and the buffoon upon the mare—this custom has prevailed throughout South America, though its origin is now forgotten, and "Yeguas" are still slaughtered in thousands for their hides and fat. And there are superstitions about marks and colour which remind us of complicated Arabian system; for instance, a horse marked with a cross will never drown you.

The effect of promiscuous intercourse appears in wall-eyes, locally called "glass-eyes," which are painfully common, and in coats of many colours, fit only for the circus. The noble bay, chestnut, and iron-grey are rare: many are skewballs, and the piebald, which in Texas would be called "Paint," and in the Brazil Jardim (a garden), are perhaps considered the best. Some writers declare that the white are most esteemed, and the black least—I found both exceptional as in the Arabian breed. The foals often wear long fleecy coats, and here the renowned Mr Barnum might have bought many "woolly horse," real, not manufactured; but whether the few would have lasted in the latitude of New York, deponent sayeth not. Of course they are hardy and sagacious from mode of life. In winter none but

favourites are stabled and fed on hay; the others are left out to fare as they best can, on the refuse of the cows and on offals, such as fish bones and heads.[1] At last, when it becomes a matter of life and death, the poor brutes are put under shelter, and fed with a few handfuls of fodder. On the other hand, they are perfectly free from the dire cohort of equine diseases produced by the close and heated stable.[2] Like the sheep, they thrive upon the many and plentiful fuci that line the shore; a similar necessity teaches the horse in the interior of the Brazil to paw open and eat the cactus flesh. Thus the price is nearly all profit to the breeder. During the cold season Icelanders ride very little, if at all: where the snow is deep and hard they use sledges and rough-shoe their nags. They are ready for travel in early June, although I was told the contrary in England by those who should have known better; but the razor-backs at this season require carefully-padded saddles. From that time they get into better condition; they are best in July, but in August again they are soft and blown out by too much green meat. All are shod, and very badly shod; the stones are sure to injure the frog, and Arab plates would be a great improvement. The only remedy known for sore backs and saddle galls are cruel setons in the breast: the Raki of Syria and the Caxaça of Brazil, applied when the saddle is removed, would prevent much of this evil, but spirits are too precious for "uso esterno." The ears are cut off, not to prevent the Pasha impounding them, but as a mark; and the nostrils are slit with the silly idea of improving the wind. They never see grain, which they must be taught to eat, and salt is not regularly served out to them. From perpetually licking one another's skins, they supply fine specimens of Œgagropiles, the light and

[1] Nothing easier than to teach the horse meat-eating and fish-eating. Where little and highly nutritious food is forced by the necessity of saving weight, the habit is acquired in youth.

[2] In this matter the last few years have seen a wonderful improvement amongst us; still, I have visited wealthy stables in England where the thermometer stood at 72° (F.), equal to Boston Hotel, or to an Anglo-Indian London Club. It is difficult to reform the evil where grooms sleep above these ovens, where hot air saves grooming coats, and where the vet. requires to make a livelihood. The perfection of horse-stabling appears to me a modification of the Afghan system—protecting the chest and body with felts, thick or thin as the season demands, and allowing the head and throat to be hardened by cold, pure air.

polished balls of hair, the *Tophus Ovinus* of Norway, so commonly found in the stomachs of Brazilian cows. Broken wind is common, and cow-houghs are the rule.

The domestic animals of all countries bear testimony to the character of their owners: reason, or the result of a developed brain, acts and is acted upon by instinct, or the imperfect brain produce, the two being different in quantity, not in quality. Man and beast learn to resemble each other much after the fashion of Darby and Joan: the servants of menageries, like those of mad-houses, become peculiarly brute-like, whilst animals educated by men have an unspoken language which it is not difficult to understand. In Iceland the horse has learned much from his master. The hardy and hard-working little brutes are, like other quadrupeds and bipeds too, curiously headstrong and self-willed. Their obstinate conservatism is offended by anything savouring of innovation: I tied a bell to the leader, and he showed his resentment by all the pettishness of a spoiled child; as a rule, they appeared rather frightened than pleased by the music so attractive to the Spanish mule. Each has his own peculiar likes and dislikes: one shuns the puddles, objecting to wet feet, another avoids rock, and all hate loose stones: the lazy tread in preference upon the tops of the grassy mounds, bog-trotting like humans; and these are the least safe; others step in the hollows, as the trusty Brazilian mule in the "caldeirões." They resemble the riders in their dislike to beaten paths, probably from experience of cracks and holes; they will at times resolve to go no farther, and they have been known to stand in the same position until killed by the cold. Upon bogs and swamps they seem to feel the surface, to walk with the head down, and noses depressed, smelling the ground. They change pace and swerve, as if starting, when they come upon crevasses, with a suddenness and an agility which has unseated many a traveller; and like mules and asses, they are unwilling to part company—another sure sign of ignoble blood. Those over nine years old are much preferred, because more prudent and experienced: they are even better when nearly double that age, and they live from twenty to twenty-five years.

The best roadsters are natural pacers (Skeið hestar, or Vakurhestar), moving like the camel and the elephant, two legs on one

side, instead of traversing: this is the well-known Paço, introduced into Southern Europe by the nearer East. Many have a false amble (að valhopa), cantering with the forehand, and bog-trotting behind: this the people like because it easily covers six miles an hour. They are utterly untrained to trot and canter (að stikkva); consequently, all go false: I cannot but think the trot proper a purely artificial pace; in the so-called wild horse it serves only to connect the walk and the canter, and it is never kept up for long distances. This does not apply to the amble or shuffle of the Barb and his American descendants: the former was driven to this specialty by the necessity of raising the fore-legs to clear rough, thorny ground, and the peculiarity has been artificially developed. If you attempt to make them back, they will probably, like Argentine animals, tangle their legs and fall; few are accustomed to leap, and the smallest ditch makes them spring like buck-jumpers when put to it. They might be expected to prove surefooted, yet systematic tripping and stumbling on easy ground are inveterate evils; the people blame the rider when the pony breaks its knees, and the arms ache with the exertion of holding the brute up. I once tried, for experiment, giving my nag its head upon a tolerable road, and it came down with me three times in a few hours' march: my military saddle, however, was unusually heavy; and, of course, increase of weight requires exceptional animals.

It is a good plan for the first day or so to use spurs, which, as I have said, are now all but unknown to the people. The only instrument of punishment is a whip with short handle and strap, the latter always coming off, and if this be absent the animals become utter slugs. The comfortable traveller brings with him an English whip, and the long thong is very useful for driving. Education is confined to making the animal stand still when the reins drawn over the head are thrown upon the ground: the custom is general throughout Australia and the Argentine Republic; and I should recommend it to cavalry where the thongs are not always liable to be wet and dirty; they are great at climbing mountain-paths and hopping from rock to rock; they ford rivers well, walking crab-wise with heads up stream, and in the "scour," violent shallow water, they kneel to their work. The

worst footing for them is the boulder-paved bed. If they happen to fall in fording, the best way is to slip off on the current side, to hold the rein firm, and to steady one's self by pommel or cantle till the shore is reached. Those taken to England soon sicken under change of diet and climate; some have done well as ponies for children, and I saw a neat pair driven at Edinburgh.

There is an art in riding these little mustangs, and an Icelander will get more work and better pace out of them than a stranger. Of course the slowest gives the rate to the caravan, and this will sometimes not exceed three miles an hour—making the journey an *écœurante corvée.* All assure you that they never kick; you hear the same in the Argentine Republic; you believe, and sooner or later you are kicked: two Englishmen of my acquaintance suffered in the flesh, and an Iceland pony suddenly did its best to knock out my teeth. Rearers and bolters are rare, and I saw only one biter; the people are not brutal to their beasts, but only careless. Temper never shows so much as when they are loaded; the worst are the riding animals, which lose all manners, apparently feeling insulted by the proceeding. They will never keep Indian file like mules, they rush past one another, bumping and striving to destroy the traveller's traps; if a load happens to become loose or to shift on one side, there is a grand scene of plunging, of lashing out, especially at pots, kettles, and kegs, and of running away till everything is strewed on the ground. About evening when hunger becomes imperious, and especially where forage appears, they wax wild as antelopes.

"Omnis commoditas sua fert incommoda secum;"

but this is an inconvenience worse than anything that I have seen, even when travelling with half-broken Brazilian mules.

The people boast that their shaggy, long-backed, short-legged poodles equal the noble blood of Arabia, cover 100 miles a day, and carry 300 lbs.—Uno Von Troil says 400. The Thingmannaleið, the recognised march to the Althing, however, is from twenty to twenty-five English statute miles, and I have found 100 lbs. to be a full baggage-load.[1] By proper management, the Lest

[1] This is a general rule: 65 for an ass, 100 for a pony, and 120-150 for an ox. The latter are not trained to carry luggage in Iceland, and it is hard to tell the reason why.

(caravan) may be pushed on at a pinch some thirty-five to forty miles a day, but every third march should be followed by a halt. On one excursion we allowed three rests in twenty days, but the nags did not recover for many a week. They must not start before ten or eleven A.M., after they have had a good morning feed. They are allowed to drink when and where they please, but only after the chill is off the water. The Icelander seeing a fresh, green grazing, generally dismounts to let his animal have a bite and stretch its limbs, like a dog fresh from sleep. A careful man will walk up and down the heaviest places. About three or four P.M. there is usually an hour's halt and, during the summer, as the nags suffer greatly from the sun, night-travelling, if we can so call it, where all appears one night and one day, is the rule. Straying is also an inveterate evil, especially in bad weather; the hobbles are rotten cords or withers fastened by bits of sheep's shanks. Side-hobbling must be attended to; if only the forehand is tethered or knee-hobbled, the beasts have learned by practice to hop as fast and as far as kangaroos, and they will easily waste the best part of an afternoon. Like the Norwegian nags, they are exceedingly fond of rolling in the sand, and consequently the saddle suffers. The shoes should be inspected after every march; in the country parts they may generally be replaced for $1 the pair.

Icelanders ride from the days "when they first see the blood upon their teeth;" their foot gear and the nature of the country incapacitate them from walking, yet with our shoes they would soon learn to climb well. There is a fashion in these things. The Mamlúk Bey would never cross even the street except upon his mare; and the Brazilian church-goer will send many miles for his horse to ride the same number of yards. A walker in Iceland is a low fellow, like the "Zalamah" of Syria. The islander mounts as often on the wrong side as not—of course every cavalry-man should be trained to do the same. His long back and short legs make him a curious contrast with his dwarf monture, and apparently he is easily dislodged—I have seen men come off even when the animals are only bogged. Another element of grotesqueness is the perpetual hammering of the unarmed heel against the animal's ribs; this "devil's tattoo" keeps

the feet warm, and the horses will lag without it, as the Egyptian Fellah wakes when his water-wheel ceases to creak and groan. The effect is an indescribably loose and shambling seat.

Although cavalcades look tolerably well from afar, individuals are ungraceful and unhandy riders compared with the Gauchos: an Englishman observed to me that the latter will do in the dark what would puzzle the former in the light. The general seat is somewhat like the English, a kind of *juste milieu* never adopted by purely equestrian races. The Eastern horseman, take the Tartar for a type, sits his horse with "crumpled legs," as if upon a chair. The Western, that is to say, the peoples of the New World, without exception, stand, as it were, upright with legs apart, riding by balance alone. The Oriental style was probably suggested by the greater steadiness of aim, with bow or gun, obtained by rising upon the shovel-iron stirrups clear of the animal's back. The Occidental seat was evidently the result of long weary marches over monotonous prairies and pampas, and it never leads to rupture like our cavalry seat; riders carry little weight, and their waists are not tightly buckled down so as to press upon the part most likely to give way.

It is a spectacle likely to be remembered, the shoeing of Iceland ponies by the farrier, who is almost always unprofessional. Five men, without including half-a-dozen spectators and advisers, bodily engage in the task; one holds the cruel twitch, two hang on to the several limbs, one or two hold up the hoof, and number five plies the hammer. And the result is that in travelling you must always expect your animals to be pricked.

The traveller should take out with him a comfortable pony bridle, if he intends to ride far. An Iceland bit is horrid to look at, but the long, heavy mass of brass is never cruel; the chain is not tightened, often, indeed, it is absent, and sometimes a bit of cord does duty. Happily for the horses, they have no curbs, and I have many a time wished that we in England could unlearn the use of them, or rather learn to use them only when required. Nothing more unpleasant than to see both sexes in Rotten Row worrying their animals into perpetual fidgets, and making them throw up their heads like giraffes on the run. And this is not confined to Hyde Park: at Edinburgh I saw an

escort of one of our best cavalry corps so pulling at their curbs, that every charger seemed to be upon wires. A light hand is not given to every rider, but all can spare the mouth by using the snaffle.

Upon the whole, I should say, hire your nags. Buyers no longer sell for a song, as the foreign horsedealers are ready to pay fairly for good animals; yet besides the risk of being jockeyed—and in the matter of horseflesh the Icelander is quite the peer

"Of a Yorkshireman hippodamoio"—

the owner, as has been said, will be obliged to travel slowly, and he will incur additional troubles where the inevitable amply suffice. Tolerable riding beasts (Rið hestar) may be hired for $1 (= 2s. 3d.) a day, and baggage-animals (Puls or Klifia hestar) for four marks. The hire should be paid after return. The guide is sure to take the best, in order to whip up stragglers, and he will be the more careful of his monture if he be its owner. Formerly, dogs trained to bark and to keep the Indian file straight, always accompanied caravans: now they are rare and dear. The use of the Madriña, or bell-mare, is utterly unknown—what does Henderson mean by making the Arab's bell-camel go last in the line instead of first? An extra baggage-animal, besides remounts, is always necessary: the day of the Hesta-kaup is long past when you could exchange a lame or tired-out animal at any farm-house.

The Iceland saddle (Hnakkur), well stuffed and provided with a sheepskin, can be bought at Reykjavik at prices varying from $15 to $50, but the old campaigner will prefer a roomy old English hunting saddle, duly prepared for "razor backs." The woman's saddle (Söðull) costs from $40 to $80: it is a kind of arm chair, fronting the near side, and covered with brass ornaments: the feet are supported by a piece of board; and the whole affair is very dangerous—M. l'Abbé Baudouin saw a woman drowned when crossing a not very rapid river by the fault of her riding gear.[1] The lower classes ride *à califourchon* like the *hautes et puissantes dames* of the old noblesse de Cam-

[1] Astraddle was doubtless the earliest form of feminine seat, yet Mr Newton found at Budrum a statue of Diana sitting her horse sideways.

pagne, and roll off like bundles of old clothes. However unseemly, the straddling style is ever the safest, and I should strongly advise the seat *en cavalier* in countries where the side-saddle might lead to accidents. The form of riding should be that of the Libanus, with a long arm and a short bridle, always ready to hold up the animal, but never attempting to check it. And those disposed to *vertiges* should look at the bank, never at the fast-flowing water.

The baggage will be a perpetual trouble. I deposited at the rooms of the Anthropological Institute a specimen of the Klifberi (crook-saddle), the Klibber of the Shetlands, with its pegs of reindeer horn, so useful for fraying everything they touch. This article will cost the stranger $3 to $6. There is, however, a modern and improved form, which is far worse; the arch, banded with iron, rises some five inches above the animal's back, and effectually destroys whatever rubs against it. If the people could be induced to adopt the Otago pack-saddle, used by the transport trains in the Abyssinian expedition, and commended by Messrs Freshfield (Caucasus) and Stanley, it would be invaluable. I also exhibited specimens of ropes with horn circlets, for making fast the luggage; they are expensive as useless, and $3 buys a very small supply. Finally, I showed the popular "namdah" of the island, two heavy slabs of turf, not unlike a very thick mat: they are the fibrous roots of the buck bean or marsh trefoil (*Menyanthes trifoliata*), in books called Hor-blaðka, but here known as Reiðinga-gras. The damp heat produced by this article acting upon chafes causes back-sores, which are sometimes fatal: the Færoese smoke and chew the leaves of the "Bukka Blaa" as tobacco, and hold that in infusion they cure scurvy. In the pagan days of Iceland, strips of buck-bean turf made a yoke under which criminals were compelled to walk; and when two men swore brotherhood or foster-brotherhood, they passed through an arch of three long sods, whose ends were attached to earth, and whose centre was raised by a spear.

The Iceland box is very like that which old-fashioned Brazilians use for mule travel: it admits wet; it readily falls open; and, when tourists are numerous, it is not easily found at Reykjavik. Mr Shepherd, of North-West Peninsula fame, had a

model pair made by Silver & Co., which own but one disadvantage—being "un-Icelandic," the guide will object to load them. One writer sensibly advises travellers to pack up and to roll everything down the staircase; if the cases stand this test, they may be passed with approval. Still everything will by degrees be smashed and spilt: cartridges will be crushed or shaken loose; salt and sugar will be mixed; oil and spirits will swamp books and flies; and collections of botany and geology, unless inspected every day, will be lost or damaged; strong tins will be crushed like paper; even cast-iron would not be safe. The scene on unpacking for the first time after a march is "a caution:" Iceland in this matter reminded me of Blá-land (Blue Land, *i.e.*, Blackland), where the ingenious negro managed to split a Papin's Digester, making me "marvel how." Saddle-bags are hardly fair to the ponies, and carpet-bags and canvas-bags being strange luxuries, will be stowed away over the boxes, and will be worn through by the hide-lariats which assist the rotten woollen ropes. Though bred to loading from his childhood, the Icelandic guide has neither the skill nor the appliances of the Iberian or Brazilian "Arriero;" anything like a miscellaneous load will at once be shaken off by the rough jog-trot of the ponies; the girths break, and the halts for reloading become hourly, and even bi-hourly. There are two ways of conducting a caravan: one is to drive the animals loose (að reka hestar), the other is to lead them (leiða hestar í taumi, *i.e.*, in team); the latter is generally done by the care-taker (Lestamaðr) when approaching the farmhouse-tún, and halters are fastened to tails in a way that would surprise a Syrian thoroughbred into the height of misbehaviour. This "cringing," as Shetlanders call it, is also the tether for short halts, and it proves effective enough, as they can only wheel round in a narrow circle—vicious withal.

The traveller will find a tent necessary in the interior, but only on account of the rain. During their September excursions, when the farmers ride considerable distances to collect sheep from the distant pastures, they camp out like Bedawin: as amongst the Canadian Indians, this change from the superheated atmosphere of the house grows a plentiful crop of colds,

rheumatisms, and lumbagos. When they travel with baggage, they carry tents like miniatures of the East Indian "pál," and the large inmate rising from the minimum of space suggests a "Jack in the box." Two uprights, four or five feet high, are connected by a cross-pole of five to six feet, and over this frame is thrown the cover of coarse white Wadmal, braced by cords at the edges. The flaps have small holes for wooden pegs, generally three behind, and the same number on each side; when these are lost, stones and turf (Siberian fashion) do duty for them. Goods not likely to be injured are piled outside as a "break-wind" and, even when the fore-flap is closed against rain, two men will stow themselves away inside. My friend, Mr Robert Mackay Smith, kindly lent me a little bell-tent, which had already seen service in Iceland, and which proved uncommonly useful. A mattress is usually held a necessary, but I found a Syrian Postín of black sheepskin spread upon a caoutchouc, by far the most satisfactory article. The traveller, however, must beware of "waterproof blankets," which are sadly apt to belie their name in an Iceland "shower."

Writers who know Oriental travel only by books are fond of finding reflections and resemblances in the far north; the differences, however, are far greater, and the general likeness is soon destroyed by the details. The horse, the tent, the bivouac, and the desert are salient points of similitude; the want of life, of colour, and of picturesqueness, the main accident of the East, soon break the spell. And the traveller in Iceland will miss many things of which he has read, as the "kiss of peace," the pulling off boots, etc., by the daughters of the house, and the parting salute by way of good night. These things may survive on the rarely visited south coast; on the beaten tracks they are of the dead past—at least I never saw a trace. Civilised coarseness and polite vulgarity have made Icelanders deny that the custom of public undressing ever existed: they are wrong to be ashamed of it. The removal of muddy boots, wet stockings, and drenched garments, without any sense of the "sho'king," was a sign of innocence; the action was without any sense of impropriety, even as the primitive matrons and maidens of St Veran thought it uncivil to leave the room before the guest was fairly in bed.

CHAPTER VIII.

EXCURSIONS ABOUT REYKJAVIK—THE ISLANDS—THE LAUGAR OR HAMMAM—THE SOUTHERN LAXÁ OR SALMON RIVER.

THE weather appears to be that of the Inferno-circle, especially rich in—

"La piova
Eterna, maledetta, fredda e greve."

However, we take heart of grace to visit the islands. A boat is readily found at the Bridge-House pier, the centre of industry. Here are knots of fishermen, who might be in Leith, save that they are a wee bit rougher; and the stout young women labouring with coals and rolling up barrels of spirits, reminded me of the Teutonic emigrants to Rio de Janeiro, where each one would girth double, and probably weigh treble, the average *Brazileira*. At times there is a lively scene when ponies are shipped, an operation managed very rudely, not to say brutally: the animals are dragged or driven down the slimy, slippery plankway, and are forced to spring into the nearest barge; they are accustomed to ferries, but not to this kind of embarkation, which barks the shins and wounds the hind legs. At times a little animal is jostled off the narrow gangway, but instead of falling or leaping down, it clings like a cat with the forelegs, and holds on long enough for men to run down and catch it in their arms. The most amusing scene was when an Englishman inflated a waterproof cloak, the Halkett-boat, and another, taking in hand two apologies for paddles, began a series of astonishing gyrations. All Reykjavik flocked to the pier, possibly under the stimulus thus poetically recorded:

"Pull him out! pull him out! he fell from yonder boat,
We shall either get a sov'reign or a one-pound note."

They were disappointed, however, for the Britisher gallantly held his own, and taught the spectators "a thing or two."

A few minutes of sharp sailing placed us at Engey, meadow-islet, the central of the three largest which defend the Rade of Reykjavik. It projects to the south-east, a long spit of loose rocks, covered, as usual, with fucus[1] and seaweed: here two huge ravens are hung up as scarecrows to keep off their kind, and to frighten away the great Erne or cinereous eagle (*Falco albicilla*): this determined enemy of the eider duck sometimes haunts the Laxá mouth. The "beneficent palmipède" is about two feet long, and weighs 6-7 lbs.: it swims the water gracefully as a swan, and is a strong and straight-flying bird, giving excellent sport: the drake's plume is silver, tipped with jet; the duck is much more modestly clad. The Æðr has a good time of it in Iceland. Their homes are, like those of olden commerce, the islets near the coast; they will not build, as some travellers have related, in inland lakes, and they are rarely seen ashore, preferring damp rocks, where they can feed on seaweed and insects. From its haunts dogs and cats are carefully excluded. No salute must be fired at Reykjavik for fear of frightening "somateria mollissima." The drake is sometimes poached after the breeding season in August and September: I never tasted it, but should imagine that the flavour must admirably combine fish and sea tang. The people declare the flesh to be excellent eating, worth all the other game put together, but fine and confiscation of the offending weapon await the poaching gourmand: the *amende* is a rixdollar per shot, and if the offence be repeated, confiscation of the gun. How we longed to see this happen to our Cockney friend!

The landing-place is the normal natural pier, a horrid mass of slimy, slippery boulders near a small curing establishment, whose

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[1] Information concerning them may be met with in Gosselin (Historia Fucorum): travellers have paid scant attention to this branch of botany. The wracks feed man and beast, and serve for fuel, bed stuffing, and other domestic purposes: consequently some forty-four kinds have been described, especially that impostor, the *Zostera marina*, which lies in loose heaps. The most common are the *Fucus palmatus*, *Saccharinus esculentus*, *edulis*, *fœniculaceus*, and *digitatus*. The first-mentioned is the Sol, eaten in Ireland and in Scotland, where it is called Dulce: at Oreback (Eyrarbakka), it sells for 70 fishes per voet (= 80 lbs.). The second, *F. saccharinus* (*Alga saccharifera*), is the Welsh Laver, whose spirally-twisted leaves, six feet long by one broad, become straight when dry. In the Shetlands the larger fuci in general are called Tangle, Tang, and Ware, and are extensively used as manure.

rich aroma made us hurry frantically past, kerchief over nose. Here the islet is a strew and scatter of cods' heads, cods' bones, and cod's sounds: they would be the best of compost if systematically used. Hopping from hillock to hillock of fishy grass, we reached the large and prosperous-looking farm-house, which occupies a domed rise to the north-west. The owner, Hr Christian Magnússon, was superintending his eider-down: he lives too near Reykjavik to ask us within his doors.

We then walked over the tussocky ground to the west, where the warm exposure has special attractions for the brown mothers. Our companions were troops of noisy peewits and terns: the former are spoil-sports, as in the Brazil, where I have often been exasperated into giving them the benefit of a barrel; and the latter, here termed Kría (plur. Kríur), whence our "Cree," sweep down upon the intruder in resolute style, screaming furiously, and sometimes administering a vicious peck. Possibly *Sterna hirundo* knows that its egg is delicate food for man, and becomes a winged Timon accordingly. In places these birds seem to have fled the sea, and are found hovering over the fields in search of food: they should not be shot, as they serve to keep down the earth-worms, and here the lumbricus is a pest, as in the Færoe Islands. Poultry would be useful for the same purpose, but it causes trouble, and is seldom seen in the interior. It will be remembered that the ancient Britons kept fowls only "voluptatis causâ," which some understand "for the sake of cock-fighting."

Travellers describe the eider as a very wild bird in winter, but a mere barn door during the summer season, so tame that, like the frequenters of the gull-fair, Ascension, or of the Lage near Brazilian Santos, it can be taken up with the hand. We found that they scurried away from us, uttering a hoarse "crrr," and only one showed mild fight in defence of her flappers. Nor did we see more than a single monogamous duck in each nest, despite the reported Mormon arrangements, strange if true. The usual number of eggs was two, proving that the first lay had been plundered; three was not, four was, rare. At this time (June 12) a few hardly-fledged ducklings appeared, and some could just follow the mother's flight. The old ones teach

their young the art and mystery of swimming, by leading them to the shore, bearing them on their backs a few yards out, and slipping from under them—a process which the tutor of my childhood unconsciously imitated. The nests, which are always near water, for facility of feeding, are built in hollows, like dwarf arm-chairs, or the old fur-cap of Istria: in the centre is a thin saucer-shaped lining of brown, grey, or mouse-coloured fluff, exceptionally unclean. About mid-July all these matrons will become frisky, gadding about the Fjörðs and river mouths.

Another pleasant excursion is to Viðey (wood-holm), the largest and easternmost of the three great breakwaters. In some thirty-five minutes we ran before the stiff breeze to the little landing-place, a hole in the Palagonite rock. As we approached the islet, it appeared double, connected, like the defunct Siamese twins, by a band which was bright green with grass, and which carried a few wild-looking sheep. We had seen M. Gaimard's atlas, and we had read of the "beautiful pillars of basaltic lava," but we did not find them. The formation generally is that of Arthur's Seat: in places the stone is sub-columnar; here and there it is quaquaversally disposed, the effect of lateral pressure, and in most parts it can hardly be distinguished from the amorphous. The basalts on the south of the island, and adjoining the remnants of a crater to the west, are best worth seeing, but again —bad is the best.

A rough path leads to the tall wooden-barred gate and weathercock which defend the property of good Magnús Stephensen, Chief Justice of Iceland, the friend of "Baron Banks," and far-famed for his hospitalities in the olden day. Though travellers say that he rented it from the Crown, he was the owner of the islet which still remains to his family; and about 1820 he died at the satisfactory age of eighty-two. The house is a large and substantial building of stone and lime, with ten windows facing the south, a counterpart of the smallpox hospital at Laugarnes. The characteristic remnant of the monastery, which was founded in A.D. 1226, is the chapel to the west of the mansion, a solid box of rough basalt, squared only at the corners, with rude arches over doorway and windows; the dwarf "campanile," a shed perched upon the roof, shelters three bells. In

the massive red door was a huge iron key, which may date from the days of the ghostly owners. The roof is supported by heavy solid rafters, and the furniture is older and more ornamental than usual; the benches are carved, and the colours are the tricolor, blue, red, and green.

As in many country churches, the tall pulpit stands behind the humble altar which Lutheranism in Iceland has not reduced to a table, but converted into a safe for priests' vestments. The confessional still lingers in the shape of a tall-roofed chair, like that of a hall porter; it is now used by the Prófastur (archdeacon) when he makes his visits, but the people no longer confide their sins to the ecclesiastical ear. Metcalfe (p. 317) seems to think that Icelanders are shrieved before they communicate. The only "Reformed" remnant of the old Catholic custom is the practice of seating the expectants round the chancel, when the parson exhorts them in set phrase to repent their sins, and to amend their lives. They do so, or are officially supposed so to do, and absolution duly follows.

We looked into the western room of the old monastery where the printing-press was wont to work; the rubbish lay in admired confusion, almost as bad as the sacred hill-town of Safet can show, after parting with its typographic reliques to the curious and the collectors of Europe. The owner, lounging about, hands in pockets, prospected us more carefully than courteously. Here the neighbourhood of Reykjavik is not the only cause of inhospitality: the son of the old Chief-Justice was notoriously unhappy in his family; and the heir to the "antiqua domus" is locally famed as an *animal*, in the French and Spanish senses of the term. So we wandered over the island, much to the confusion of the terns and sheep, and enjoyed a charming bath in the sea to the north: the walking was foul as usual, the swamplets have not been drained, nor have the grass tussocks been levelled during an occupation of a thousand years. Of course, in Wood-isle no wood exists, but near a farm-shed upon the western half there is an eruption of turf-stacks, which show what has become of the name-giving growth.

The tract behind and about Reykjavik is an epitome of Ice-

land, which we can see in a day's work; it admirably combines the quaking bogs of Ireland with the Pantanaes of the Brazil, the rock-slides of the Kasrawán and the metal domes and boilers of the Haurán.

"God made the country and man made the town" is a poor poet's sentimental say, which has passed into a truism, whilst every traveller knows its falsehood. The country wants the hand of man almost as much as the town does. Hereabouts, where the surface lies comparatively unbroken, the absolute absence of trees gives the dreariest impression. We do not feel the same want amongst the labyrinths of serrated ridges, where the vapours break like seas in the morning, and which are transfigured by the evening mists into glimpses of purple and golden glory; nor amongst cataracts, "tumbling in a shower of water rockets" over the perpendicular strata of basaltic rock; nor when fronting the inverted arches of the Fjörð-mouths, where the sweeping lines of mist and cloud are worthy the inspired pencil of Gustave Doré. And, though throughout the island there is not one spot which "smiles with corn," the stretches of bright green pasturage, with spangled flowers, relieving the blackness of the trap, serve passing well in the artistic eye to take the place of cultivation. In these places we escape from the eternal black and white, white and black, which sadden the eye in the interior.

The lakelet south of the capital drains large bogs and peat-mosses at its upper or inland end. It is poor stuff, which, however, like that of the Brazil, burns without chemical treatment, and it contains, as in the Færoe Islands, large quantities of birch trunks and bark, proving, if proof were wanted, that the land was not always bare of trees. Although the first colonists found the country wooded from the sea to the hills, here, as elsewhere, first colonists regarded a tree as a personal and natural enemy, to be annihilated with fire and steel. Consequently the land became bog, the centuries deepened and added to it, and now it is absolutely irreclaimable. Under the blessing of St Blazius, however, it supplies the people with fuel. The turf-digger uses a rough instrument, a straight bar of wood, with a side projection for the foot, and shod with a crescent-shaped

iron: it is the toysker familiar to the Shetlanders.[1] The material is stacked in early June, and by September it is ready for use; almost every family has its own turbary, where a fortnight's hard work would collect an ample supply for the whole year. Yet the absence of fire is one of the characteristics of the Icelandic farm-house, in which the people prefer to "pig" together for animal heat, like the lower creation, rather than take the trouble of cutting, stacking, and carrying in their peat. But here probably inveterate custom perpetuates what arose from simple indolence.

The Landnámabók (De Originibus Islandiæ Liber), corresponding with our Domesday Book and the Book of Joshua amongst the Hebrews, tells us that in A.D. 1231 the plough was drawn by oxen and slaves. The Aryan implement, never invented by the African nor by the "red man" of the Western Hemisphere, is now simply impossible. The surface is either quaking bog, where man is easily mired and "laired;" or covered with runs and boulders of basalts and lavas, porous and compact, grey, brown, red, and black; the grey being of course the oldest. This has never been cultivated, and probably never will be. The grass land reminds you of a deserted country churchyard. Many of the warts which garnish it are originally formed like "glacier tables," those pillars of ice bearing tabular rock, which protects their bases whilst the sun melts the surrounding matter. The scattered boulders keep the lump firm, whilst the ground about it is washed away: mostly, however, the tussocky warts are formed, as on the Irish bog, the Scotch moor, and the flanks of Ben Nevis, by the melting of spring-snows and the heavy rains which carry off the humus from the sides; and they show us on a small scale the effects of weathering upon hills and mountains. The water, here and in the bogs and peat-mosses, is a "gilded puddle," rich in diatomaceous silica and iron: as in parts of Ireland, it readily converts adipose and muscular tissue into a saponaceous matter like spermaceti, and it forms the "precious medicine Múmiyá" (human fat) once so highly valued for fractures and pulmonary complaints.

[1] Dr Cowie (Shetland, 1st edit., chap. ix., pp. 165-167) gives an excellent account of "peat-casting."

These warts are exaggerated by the treading and grazing of cattle in the depressions. Not a few travellers have asserted that the people, forgetting that grass grows perpendicularly, leave the knobs *in situ*, because a curve affords more surface than a plane. To a similar prejudice, also, they attribute the use of the toy scythe, which shaves round the lumps, wasting much time, and exposing the precious crop to be destroyed by rain or snow. The real cause, of course, lies much deeper. Firstly, there is the want of hands; secondly, there is the expense of day labour; and thirdly, a man must be certain of tenure before he is justified in undertaking such a task as levelling the surface of his field. The turf must be carefully removed from every knob, the latter must be planed away with the hoe, and lastly, the grassy covering must be replaced: after a few years the snows and showers will require the operation to be repeated. Meanwhile, the result is a short thin turf like that of England, but exceptionally springy to the tread, as if it had no solid foundation — in fact, something like a water-bed. A little top-dressing brings out a goodly crop of grass, and although we must despair of seeing even oats and rye, yet roots like potatoes and turnips might become much more common than they are. But then—the landlord would raise the rent.

A favourite walk with foreigners is to the Laug (pronounce *Lög*), the reeking spring, lying about two miles from and nearly due east of the town. The only bathing-place, especially on fine Sundays, between church-time and dinner at two P.M., it is the haunt of many washerwomen, and yet, during the last millennium, no attempt at a decent path has been made. You leave the town by the Krísuvík, more properly the general eastern, road, passing the fine new prison, which is rising rapidly from the ground: the exceptionally thick walls are made of hewn and unhewn trap, with an abundance of imported lime, blackened by basaltic sand. There are apartments for the officials, and ample accommodation for all the criminals in the island; indeed, if the interior only equal the exterior, its superior comforts may act, it is feared, like our old transportation system, and offer a premium for breaking the law. On the

right, you leave the Skolavarða,[1] or school mark, so called because it was built for the College. This "observatory," as foreigners call it, is a two-storied building, ascended by two sets of double ladders: the view from the green-painted hatchway which defends the opening above lays the land before you like an embossed map. The lower story is foul in the extreme, and there are scandals concerning the uses to which it is normally put. The wooden building of old charts has clean disappeared. No place could be worse adapted than this for an observatory, at least, if magnetic instruments are to be used. The French expedition found that the surrounding volcanic rocks gave the most discordant results, for instance, 2° 32′ to north, and 11° 15′ to south, upon the same rhumb. M. Lottier (p. 35) offers the following comparison of magnetic declinations:

1. At Reykjavik, 43° 14′.
2. ,, Thingvellir, 40° 8′.
3. ,, Geysirs, 45° 50′.
4. ,, Selsund, 40° 49′.

He remarks that the first is probably correct on account of the care with which the site had been prepared, two granite blocks having been laid down upon the hard ground below the turf. The second was vitiated by a huge *coulée* of lava; the third by the looseness and Plutonic nature of the soil, whilst at Selsund the Hekla *massif*, distant only a mile to the north-east, must have exercised a disturbing effect.

Striking to the left, we pass the detached farm-houses, and hit the shingly and rocky margin of the shore, which here and there shows heaps and scatters of sub-columnar basalt. Presently, after treading the pebbly bank and stony tracts, well garnished with mud, we reach the mouth of the little stream, or rather the place where it should mouth. Here, as on many parts of the coast, where not protected by islands to windward, or where the rock does not come down to the water's edge, a high bank of

[1] Varða, in the plural Vörður, is a beacon, more generally an "homme de pierre," a pile of stones to act as landmark or way sign; it is derived from að varða, to ward, to guard, monere (quod hîc vicus est). Our travellers generally write the word in the Danish form "Varde." These piles, like the "'a'úr" (Kakúr) of Syria and Palestine, are often put up by the shepherd lads, apparently for want of something else to do.

sand and shingle is thrown up, and retains the water in pools of various extent. Mostly, these basins are briny, being affected by the percolating tide which ebbs and flows regularly inside: they explain the presence of the upper bog; the matted roots of the vegetation prevent free drainage; and the want of slope would probably render even deep-ditching ineffectual.

We cross the streamlet higher up, and ascend the right bank, where walking is better than on the left, wondering the while that during so many centuries of use the feet of the washer-women have not worn a way. Here at length is some sign of life. "The lady-hen sings to the riv," as the Shetlanders say of the lark, but her carol is at the gate of a milk-and-water heaven. The curlew and the whimbrel scream their wild lay in the lower air; the snipe rises with a peculiar twitter; the snippet bathes where the water is warm; the water-rail (*rallus*) courses before us; the true sandpiper (*tringa*), accompanied by a purple congener (*T. maritima*), with brown back, white waistcoat, black colours extending over the eyes and crest, with long red beak and legs, forages busily for food; whilst waterfowl, including the ubiquitous eiders, male and female, float lazily off shore. In many places the sandpiper behaves likes the Brazilian João de Barros, alighting before the traveller, and apparently enjoying the fun of narrow escapes.

A number of ponies, awaiting transportation to the mines of Great Britain, were grazing about, and bolted as we drew near. The few cows, almost all hornless, had small straight bodies, and large udders, which are said sometimes to give from ten to twelve quarts of milk per diem, and 3000 per annum; the proportion of butter being 1:16. Wretched bullocks, not weighing more than a Syrian donkey, were fattened for foreign markets: surely the roast beef of Old England never appeared in meaner form. Presently they will be lashed to ponies' tails, and afford much amusement to the gamins of Reykjavik by springing over the little drains with such action as the Toro at Ronda attempts the barricades. The ewes, dull-yellow, straight-eared, and thin-tailed, some with coats, others sheared, or rather plucked, in Shetland parlance "roo'd," were at a distance to be mistaken for goats; in June most of them are accompanied by lambs, singlets

or twins, looking extra innocent. They yield a couple of quarts of milk per diem, or about fifty per annum, and their fat is said to contain an unusual proportion of stearine. Merinos have been tried, and to them many people attribute the dreadful scabies which has raged since 1855. The goat, once so common, is extinct in this part of the island, at least I never saw a specimen in Iceland: this destructive animal could not have been much at home where there is so little wooded land; and it was proscribed for climbing upon the turf roofs, and doing other damage. The happy mean has been hit by Istria, which issued laws in early ages *de capris non tenendis*, and which now allows goats only in the wildest and stoniest parts. It will be a fortunate day for the Libanus and Syria generally when the graveolent there falls into like disfavour.

The comparatively fertile banks, clothed with the *Lecidea Lindleyana* grass, shows us, for the first time, the pretty Icelandic flora in full bloom; and the general effect is yellow, as that of Palestine is red: this arises from the large proportion of buttercups (Icel. Sóley) and dandelions. The properties of *Leontodon taraxicum* in hepatic disease, either as coffee or as salad, are here quite unknown; the Icelanders call it Unda-fill, and the Færoese Heeasolia. Its flowers are used in the southern islands for yellow dye, and the leaves are eaten in spring: after that time they become bitter. There is an abundance of golden liverwort (*Parnassea palustris*) and cross-worts (*galiums*) of many kinds, locally called Maðra and Kross-maðra; of Alpine saxifrages (*S. hircula* and *oppositifolia*), of azaleas (*A. procumbens*), pretty red flowers, loved by sheep; of lilac-tinted butter-worts; and of the yellow ranunculus, common in the Pyrenees and Alps. The wild thyme (*T. serpyllum*), which preserves a strong perfume, whilst the four violets have lost it, is termed Blóðlýng by the people, and, mixed with other leaves, is extensively used in ptisanes to "thin the blood." An orchis, an equisetum with small stiff leaves, and a "fox grass," as the fern is locally named, faintly remind us of the tropics—ferns always have this effect. Very familiar to the eye are the daisy (in the Færoes, Summudaar), the white chickweeds (*Stellarium* and *Cerastium vulgatum*, locally called "Musar-eyra,"

(mouse's ear); the forget-me-not (*Kattar-auga*), which flourishes everywhere; the white cardamine (*C. pratensis*); the common bitter cress, which Icelanders call Hrafna- (pron. *Hrabna*) klukka, or raven's bell; the other pretty little crucifers, and the rhododendron (*laponicum*, Icel. Kalmanstúnga), with a delicate red flower. The Iceland heath (*Erica vulgaris*) here becomes a valuable plant: the people say that sheep cannot die where it abounds, and they use it with peat and brushwood to smoke their meat. The geranium (*G. silvaticum*) is common, especially the malva, known as Ljons-kló or -löpp (lion's paw), a name evidently given by those who had never been presented to King Leo. The Fífa, or cotton-grass (*Epilobium* or *Eriophorum polystachion*), with bright white pods, which extends from Iceland to South Germany, and which fattens sheep in Dumfriesshire, will haunt us in every swamp: it is a much maligned growth, and it serves to make the bog far more solid and less like a rolling carpet than the "Serbonian" feature otherwise would be. The less familiar plants are the crowberry (*Empetrum nigrum*), eaten by Corvus in Scotland before the grain is ripe; the red cowberry (*Vaccinium vitis-idœa*), which mostly affects the hills, and is preserved for pancakes; the grass of Parnassus (Icel. Mýra-sól-ey); and a moonwort, rare in the British Islands.

The deep, narrow ditch winds through the plain, with bulges here and there, which make good bathing-places: what little steam there is, generally courses before the wind down the valley. The old centre of ebullition is denoted by a small green mamelon or tumulus on the right bank, supposed to be the site of a large spring once boiling: hereabouts poor, brown, and fibrous peat is stacked, and on week-days it is the meeting-place of a dozen Baðkonur (washerwomen),[1] of all ages, from grandmother to small girl. A baylet in the right bank shows the present focus of ebullition, though a little below, on the left side, the

[1] Kona, of old Kwina and Kuna, is evidently the English Quean (but not Queen). It is a congener of γυνή (Sansk. Jani), which the Rev. Wm. Ridley (p. 390, *Anthrop. Journal*, July and Oct. 1872) traces through Guni, Gun, Gyn, and Gin, to the Australian "Jin:" why not take it at once from the Arab. Jinn (Genie), a manner of devil? For many years, Konungr (A.S., Cynig, our King) was composed of Konr, man of gentle birth, and Ungr, young; but the Dictionary pronounces this to be a mere poetical fancy.

water above a dwarf rapid is scalding hot: at the former, the thermometer (F.) readily rises to 175°, and soon cools down stream. Higher up again the little ditch, coloured with bog iron, and with strongly chalybeate taste, is icy cold: as at the celebrated Snorri's Bath, all degrees of temperature can here be combined, and whilst one hand is parboiled, the other is chilled.

The water after traversing heated substances, evidently pyritic, effervesces from a bottom of dark-grey mud; and when the stone is exposed, we find heat-altered bazalt covered with a whitish incrustation, silica, the chief ingredient, being deposited in a gelatinous state. There is a strong smell of sulphuretted hydrogen, so commonly remarked in dormant springs, and the offensive presence should recommend it to skin diseases, especially where the *Sarcoptes scabiei* is present. From the muds and deposits of these waters none of the rarer earths, like yttria, glucina, and oxide of cereum, have been found, though traces of cobalt occur: lime and magnesia abound; manganese, iron and silica, soda and sulphuric acid, also exist in considerable proportions. Dr Murray Thomson has carefully analysed the produce of the Laug.[1] Eels are mentioned by travellers, but we never saw them: in the lower course there are shell-less snails and a variety of worms (pupæ ?).

Broken bottles and fragments of the "Constitutionnel" show the favourite place for bathing: formerly here, as at Thingvellir, a wooden shed was set up; now every inch of it has disappeared. It is no joke to dress and undress in the raw high east winds and the bursts of storm, but the exceptionally healthy nature of the climate asserts itself under these unpleasant circumstances. As there are traditions of a French sailor having

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[1] The pint was found to contain 3·51 grains of solid matter. The specific gravity (at 60° F.) was 1000·21, and the components were:

Silica,	1·04 grains.
Protoxide of iron,	0·24 ,,
Lime,	a trace.
Magnesia,	0·2 ,,
Soda,	0·84 ,,
Sulphuric acid,	0·76 ,,
Chlorine,	0·40 ,,
Organic matter,	0·30 ,,
Total,	3·60 grains.

died of pleurisy after a bath, common prudence would suggest a sunny afternoon. The amount of refreshment derived from the "Hammám" is immense. Strangers in Iceland often attribute to other and less cleanly causes the sudden eruption of Lichen (misnamed *Tropicus*) or prickly heat, the nettle rash which the Danes call "Red Hound:" it seems to be as common about the poles as throughout the tropics, and many of my English acquaintances suffered severely from it in Iceland without recognising it.

From the bath we walked over the stony bog to the nearest Bær, which is generally deserted: it is occupied by the caretakers of the Laugarnes Hospital. The two-storied whitewashed house is built of irregular and unsquared basaltic blocks: the frontage is south of west. Each of the two floors has three windows, and the wings two on the east and west, but none to the north. Formerly the episcopal palace, it was last occupied by Bishop Steingrímur Jonsen: the present dignitary has always preferred the town. It has now been converted into a smallpox hospital: two patients died there this year (1872); since then, as no cases have come in, the doors are locked, and the attendants are engaging themselves elsewhere. In olden times it was connected with the town by a *chausée*, a causeway somewhat like the remains of the Saracen, miscalled Roman, roads which cross the flat country south of Damascus. Bad as it is, the fragment teaches a useful lesson—never, if possible, to quit an Iceland road. "Follow the highway tho' it winds," say the Tartars.

A Scotch gentleman, well-known in Iceland as a firm and hospitable friend to Icelanders, proposed to buy Laugarnes for a summer residence, to pay $3000, and, moreover, to conduct the water in tubes to Reykjavik, where it might lead to a habit of Russian baths. Unhappily, it belongs to a company, or rather to half-a-dozen proprietors, who have added Klepp, the adjoining property: they showed their unwisdom by asking $4000 for the original estate, and now their terms fluctuate, according to chances, between $8000 and $14,000.

From the Hospital we follow the shore to the Laxá River East. On the way there is a deposit of very light blue-grey hydrate of iron, cellular and globular, and rich in water, and phosphorus:

it is supposed to result from the decomposition of titaniferous iron, contained in the underlying dolerite. Close to the sea, and conspicuous to those who sail by, is a classical spot, the Haugr, howe or cairn of Hallgerða, the fair-haired with the thief's eyes. That lady, so famous in Iceland legends, virtually murdered three husbands; the last was the "peerless Gunnar," who, some years before, had slapped her face. She lived upon this farm, which she inherited from Glum, her second victim; she died in A.D. 996, and she was buried with all the honours of her rank. The tumulus always remains green, doubtless a token of Heaven's approval bestowed upon one of the strongest-minded of her sex. Should Mary Stuart succeed in being sanctified, the abominable Hallgerða surely has a chance: at present she is known to local fame chiefly from the beauty of her locks, which hung down to her waist. She is one of those women in history whom one would like to interview.

Another tract of stone and bog led us to the Laxá River, which discharges into the usual broad Fjörð, fronting Viðey, and bounded on the east by the low, chapelled point of Gufunes (screw naze). The name, often written Danicè Lax[1] (salmon) Elbe or Elve (river), is common in the island, which may contain a dozen Laxás: there are four near Reykjavik, each distinguished by some local affix. Henderson erroneously calls it Hellirá, river of caverns, from the many holes in its lava bed; others prefer Hellurá, river of slabs: so Newfoundland was first called Hellu-land. The classical term, however, is Elliðaá, from the ship "Elliði," which Ketilbjörn Gamli (the old) caused to be dragged through river and lake. It rises in the Elliða-vatn (Ellwich-water), a circular lake with tuff walls, showing an extinct volcano: this place, about one hour's ride south-east of Reykjavik, is a famed place for picnics, and is much affected by men who go a-fishing. The stream, or rather torrent, rushes fiercely between tall and rocky banks, flares out at the mouth, and finds rest in the broad bosom of Reykjavik Bay.

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[1] We have Lax rivers in England. Some books translate Lax "trout" as well as salmon. This is a mistake, the former is always known as Sílungr or Forelle (Dan.): as may be expected, there are numerous terms for the fish at different ages and in several conditions.

Presently we reached the salmon ground, which is now but a shadow of its former self, doubtless the result of "barring" with weirs, traps, dams, and nets. Until the beginning of this century it was held by the Crown, and tradition declares that sometimes 3000 head, with a maximum weight of 40 lbs., were taken in a single afternoon. It was first rented to Hr Scheele, a Danish merchant at Reykjavik, and was afterwards sold in perpetuity to the father of the present Hr Th. A. Thomsen. The sum mentioned is $1200, a poor bargain for the local Government, as the yearly revenue is said to be $1000. The owner has placed six common box weirs, with crates, allowing the fish to work up stream, but not to return; and stone dams, which are removed before the ice sweeps them away in autumn—salmon and trout here spawn in October. They might be placed a little higher up for the convenience of the fish, but at any rate they are better than the standing nets, with which a Scotch contractor "barred" the very mouth of the river.

I saw the boxes opened about mid-July; but rain had been scarce, and the whole take was 15 salmon, the maximum being 5 lbs., and the average under 4 lbs.: we heard, however, that some weeks before, one box had yielded 63, and the six a total of 179. They are readily sold in the town for 22 skillings per lb., and in the country the price falls to 12 or 13. By an arrangement with Hr Thomsen, the traveller might be allowed to fish for salmon and trout in the lower stream, and in the upper waters he can so do gratis. At the same time he must keep well out of the owner's limits, or there will be work for the lawyers.

CHAPTER IX.

FURTHER AFIELD—ASCENT OF THE ESJA AND THE SKARÐSHEIÐI—THE HOF OR HEATHEN TEMPLE OF KJALLARNES.

RIGHT opposite Reykjavik rises an interesting block of mountains. Bearing due north is Akrafjall, bluff to the sea and sloping with a long dorsum inland; it is the western steeple of the long Hvalfjörð, one of the many digitations, carved by wind and water in the western coast. The eastern is the Esja, which means a "kind of clay;" some travellers miscall it the Esian or Essian, with the definite pronoun suffixed,[1] and sounding much like "the Alcoran" to an Arabist. The southern flank of this precipitous buttress, gashed with deep ravines and still spotted and streaked with snow which will not disappear before mid-August, lies north-east and across the baylet of Reykjavik: in fine weather it looks as though you could see a man upon the summit. Between the two pilasters of the inverted arch, forming the apparent bound of the far vista, is a third, a smaller and a more precipitous block, Skarðsheiði—heath of the *col* [2]—with five buttresses, waxing whiter and whiter as they leave the warm western aspect. The view is fine albeit somewhat sinister, and you miss it like removing from the Chiaja to the interior of Naples. All this, we must remember, is only a corner of the great south-western Fjörð, whose northern

[1] This suffixed article, which has died out of so many northern tongues, appears to be comparatively modern, only once showing in the Voluspa (*e.g.*, Goðin, v. 117). It is found in Coptic, *e.g.*, Mau-t, the mother, for Ti-mau; and in Wallach (Daco-Roman): the latter, for instance, says Frate-le (in Italian, Il fratello), and Dinte-le for Il Dente (dens).

[2] Skarð, common in local names, is the English Shard, a notch, chink, an open place in a bank, a mountain-pass, the Cumbrian Scarf-gap (Cleasby). Henderson gives Kampe as the popular name of a *col;* he probably means Kambi, a comb or ridge.

limit is the Snæfellsjökull and whose southern is the Skagi (point) of Suðrnes: it is called Faxafjörð, from Fax,[1] the Scot, who believed it to be the estuary of a mighty stream; the same kind of mistake gave a name to glorious Rio de Janeiro.

The eastern or inland view from Reykjavik on a fine day is not less picturesque. The clear cut basaltic line of mountains, here and there broken and jagged, stretches from north-east to south-west. In the former direction it appears a mural range, in the latter the blue wall breaks up into detached features, the regular cone of Helgafell, or holy hill, the pyramid of Keilir, "the wedge," so well known to sailors, and the four hillocks called the Trölladyngjur,[2] or giantesses' bower. Again this feature reminds me of the Jebel Haurán, and we shall find it beautifully displayed from the several mountain-tops.

On June 12 I set out with Major B. and Mr S. to try our prentice-hand upon the Esja. The vehicle was a two-oared boat redolent as usual of fat, fin, and feather; the hour was 6.45 A.M., and the north-easter was biting cold—at this season travellers should prefer post-meridional excursions, as the afternoon wind, during fine weather, invariably shifts to the genial west. The terns and the large Iceland gulls were hurrying home to the several islands, each showing the economical value of early birding.

After adding prospects of Geldinga Ness, Therney, and Lundey to our repertory, and covering in two hours the six miles' sail, we landed at the usual place on the northern bank of the dwarf Kolla Firth. It showed farm-houses scattered around and a few fishing craft carefully drawn up; a very necessary precaution when the tide is going out. On the left was Esjuberg, where Örlýgr Hreppson, converted by Patrick, Bishop of the Hebrides, built the first Christian chapel, and dedicated it to St Columbkille, Apostle and Thaumaturgus of the Picts. Farther off lay another farm upon the site of the celebrated pagan temple

[1] Meaning a mane, hair, and still preserved in such names as Fairfax.

[2] The word often occurs in Iceland; it is applied to a lady's bower or a dungeon, both being secluded chambers, to a heap of refuse (Cleasby), and to conspicuous warts and peaks of rock.

known as the Hof of Kjallarnes—we shall visit Keel-ness by and by.

It is perfectly true in Iceland that

"The sea is wet as wet can be,"

but we cannot say that

"The land is dry as dry."

Throughout the lowlands Nature, organic as well as inorganic, seems never to be free from moisture: like tropical man it always sits in a damp skin.

Having hauled up our boat we crossed the moss towards the great gash in the hill-flank, the *Caldera*, so conspicuous from Reykjavik; as usual the ground was shaky bog, and in places like an exaggerated Turkey carpet. The cause is that the shore, formed either of shingle or of vegetation decayed to humus is, as we have seen, higher than the interior, and the people content themselves with dykes for roads, and with trenches never deep enough for thorough drainage. We passed two small farms composed of the normal dwelling-places, stables, byres, and outhouses; plans and elevations of these abodes have been given by every Icelandic traveller who has used pencil as well as pen. Suffice it to observe, that throughout Iceland the dwelling-place, like the "skip," has seen better days, and that both are now hopelessly degenerate.

At the second farm lived the guide, who was absent in the fields, and we vainly attempted persuading the sailor lad, a regular "lazy," to accompany us with the provaunt-basket. An English youth would have been delighted with the chance of a climb, but these *fainéants* about the capital, timid and apathetic, will do nothing for sport or adventure, and move only when need drives.

After forty-five minutes' walk we entered the great gorge, which discharges a shallow stream, winding in many veins over its broad and rocky wady: it must be a furious torrent during the thaws of spring. We should have crossed it and ascended a sharp, rocky, zigzag on the right-hand jaw, but we had no reason to regret the error, as the deep section gave us an excel-

lent view of the Esja's internals. The formation of the mountain is still a disputed point; some hold its base to be basaltic pierced by more modern trachyte, whilst others believe in the greater antiquity of the trachyte. As will be seen, when travelling to Mosfell, or south-east, we found trachyte on a level with the Esja's foundation and, when coasting along the western flank, we saw Palagonite sandstone, dyked with trap, and underlying as well as overlying the later igneous formation. The sequence, therefore, appeared to be Palagonite, trachyte, and trap. On the Kollafjörð also there is a line of carbonate of lime running from north-east to south-west, and strongly affecting the water: hence it is judged that Iceland spar may be found there.

After a few minutes we came to a place where the gorge was split by a tall chine of rock, and where overfalls and deep inclines rendered the two beds impassable. We climbed up this hogsback, remarking, as others have done before and since, how dangerously brittle is the rubbishy stone which comes away in large fragments under the foot. The same observation constantly occurs in travels through Greenland and Spitzbergen, and the cause is doubtless that which strews the upper heights of the Libanus and Anti-Libanus with natural Macadam—fracture by alternate expansion and contraction. In Iceland, moreover, the *débris* lies in dry heaps, loosely attached to the surface and not based upon or secured by vegetation or tenacious humus, while the sharp angles of the material produces many a rocking-stone. Hence large masses giving way readily beneath the tread, somewhat surprise the inexperienced. We then fell into a long stiff slope of rock and yellow humus, puffed up under the sun; there was an abundance of water stagnating even on the sharpest declivities, and doubtless percolating from the snow strips above. Where the surface was tolerably level, rough grasses upon which a few sheep were grazing were sprinkled with mosses and with raised patches of bright green studded with pink flowerets (*Diapensia*), faintly resembling the huge Tabbán pin-cushions of the Hermon. Animal life appeared to be exceedingly scarce.

Presently the guide, who had followed us, was seen crossing the left-hand or western ravine, and only his Iceland shoes

enabled him to do so. Of course, he wore gloves, for what reason we could not divine, except to keep his unwashed hands white; and his alpenstock was an iron stick, some three feet long, with a ring at one end and a half barb at the other. He waddled like an ant-eater when showing his vigour by spurts of running up and down, and his bent and *affaissé* form was a considerable contrast to that of the mountaineer generally. He was like his brethren, the very rudiment of a guide, utterly disregardful of the guided; and in case of difficulty or accident, we expected him at once to skedaddle. When he whooped "ho!" it was the screech of a sea-fowl.

Arriving at the stiffer part of the ascent, about 2400 feet above sea-level, we should have bent to the west towards the largest patch of snow, where the angle is exceptionally easy. But our guide followed us with African docility, as we bent eastward under the tall scarps of submarine trap, which from Reykjavik appear to stand up like a wall. There were several *couloirs* to cross, mostly slides of icy snow: in August they will appear like broad yellow gutters polished by frost. Here we picked up specimens of red jasper, crystals of lime, and stones whose drusic cavities were charged with *calcaire*.

Then began the climb up the crest. The stairs, about eight or ten feet high, run with tolerable regularity, whilst breaks here and there allow easy ascent: at the base is kittle *débris*, where falling blocks may be expected. However hopeless may appear these trap walls, whose copings, straight and regular as if built by man, form the characteristic feature of maritime Iceland, they are generally climbable by creeping along the ledges below the several grades till gaps offer an opportunity of swarming up to the higher tier. If, however, a profile view shows that these traps dip instead of tilting seawards, the normal disposition, attempts will be in vain. Cryptogams were thinly scattered over the blocks; lichens appeared to be rare, and the mosses had not revived from the winter burning—as regards muserlogia there is still much to be done in Iceland.

After a walk of three hours, we stood upon the level summit,[1]

[1] At sea-level the compensated aneroid (Casella, 1182) showed 30·05, the thermometer (F.) 66°. Here it was 27·10 in the open air, with the thermometer at 40° (F.),

about 3000 feet above sea-level, and the ascent was according to the rule of the Alpine Club, a thousand feet per hour. Here rose a number of Varðas or old men. We crossed a dazzling *névé*, following the guide, who probed as he went on, for here as elsewhere,

"The snow o'erlays
The hidden pits and dangerous hollow ways."

I narrowly observed its behaviour. The ground about it was so soft and slushy that even stones would not support our weight, and the shallow edges were icy-hard, the effect of increased evaporation. On sloping surfaces the same effect is caused by pressure, like squeezing a snow-ball, and gelufication is prevented by the little runnels which the sun sets free to trickle down the gorges. The material was glacious rather than flaky or niveous, and promised firm foothold. We have read of travellers sinking to the shoulders, especially in the snow of August, but it is doubtful if this ever takes place above a certain altitude, especially in dry weather, when Iceland snow wastes away in the wind like camphor.

The "raking view" from the summit was a fair physiognomical study of treeless Thule. To the north the mountain is a mere section, a shell with perpendicular falls and steep steps of loose stone, which demand rope ladders. Before it the lowlands fall to the Hvalfjörð, beyond which the Akrafjall dorsum slopes inland, or to north-east, till suddenly arrested on the other side of the smooth green sea-arm by the five buttresses of the sister formation, Skarðsheiði. The latter looks as though a few hours, instead of two days, would reach it; and our friends at Reykjavik showed their belief in the wondrous transparency of the atmosphere by trying to detect, with their opera glasses, our small bodies creeping up the slope at the distance of at least six direct geographical miles. At Quito, under the equator, a horseman's white poncho may, according to Humboldt, "be distinguished with the naked eye at a horizontal distance of 89,664 feet, and therefore under an angle of thirteen seconds."

Turning southwards, we found the Esja summit flanked to the

and in the pocket 26·90, with the thermometer at 80° (F.). The instrument, despite compensation, must always be cooled in the shade before use.

east by three regular buttresses, like artificial earthworks, with stepped projections and horizontal lines of the whitest *névé*. Farther down were *couloirs* filled with a brown snow, in lines too steep for crossing. The highland before us reminded me of the Paramos or deserts of the Cordillera, and the view generally was a wondrous contrast with European ideas of spring beauty. The lowlands at our feet were sprinkled with lakelets and tarns, the Vaud and Soe of Norway, the largest being the Hafravatn and the Elliðavatn. The formation of the Fjörðs lay in panorama, a network of fibres and threads converging to form a main embouchure; whilst the several bays had those hooks and "sickles" of sand, which the "Rob Roy" canoe places in the Sea of Galilee, but which my lamented friend Tyrwhitt-Drake and I were not lucky enough to find. We have already remarked this wealth of "oyce" in the Scotch firths, and Elius Corvinus declares the same to be the case in Dalmatian streams:

> "Danubio et Nilo non vilior Ombla fuissit
> Si modo progressus possit hebere suos."

From south-east to south the prospect is bounded by the snow-dotted Hraun or lava-run, which in places appears as two parallel ranges. It completely hides the Thingvellir Lake, but in far distance, peeping over the summit to the east, rises the bold and rocky head of the arch-humbug Hekla. The range terminates to the south-west in Laugarfell, a buttressed crest like the Esja, beyond which the Vestmannaeyjar archipelago floats in little lumps below the cup-shaped horizon. The eye rests with pleasure upon the Helgafell cone and the pyramid of Keilir, perfect as the pigmies of Egypt: this shape is common in Iceland, and forms the best of land and surveying marks. Beyond the long, thin point of Reykjavik (Seltjarnarnes) and its scatter of volcanic islets, the dwarfed projections of Skagi and Reykjanes fine away into mere streaks of black upon the pale blue sea. Presently a cloud came over the sun, and the cold air warned us to keep moving. Ugh! how raw it was; the wind seemed to pierce every joint in our harness. We descended by the picknicker's path, showing the unnecessary trouble we had

taken: the line ran between the great gorges or rather rents in the flanks, which gave excellent sections of the interior, stratified beds of newer red and older grey-blue lavas remarkably distinct. At the foot of the mountain the thermometer, placed in reflected heat upon the snowy ground, showed 82° (F.), hardly to be expected in Iceland.

Reaching the guide's house, we were kindly received by his wife, who gave us coffee, biscuits, and excellent milk, which mixed with Korn-schnapps, even the "water-bewitched" of Reykjavik, is a most satisfactory beverage. We dropped a rixdollar, by way of being "delicate," into a child's hand. Two months afterwards, our cicerone wrote to Geir Zoega that he had guided (unbidden be it said) three Englishmen up the mountain, and had given them coffee, etc.; that his fee was $3, whereas they had left only $1 with a servant girl, from whom he could not take it. This little trait—one of many—would not be worth quoting did it not show that the unsophisticated age of the island has, in these parts at least, passed clean away.

It speaks volumes for the excellence of the climate that next morning no one, even after ten months of London life, complained of stiff muscles. We had been baked, chilled, and baked again, yet there was not a trace of "cold catching:" the latter, to resident foreigners, is not unfrequently the result of the glacier winds, but they never seem to adopt such simple precautions as a hareskin or a *Manus Dei* (poor man's plaster).

A most interesting part of the Esja mountain is the north-eastern section, where two regularly-shaped cones of golden colour, sharp towering in the milky blue air, attract the eye from Reykjavik. They are conspicuous in snowy caps, which they long retain, whilst the basalts and the dark Palagonites assist the thaws. I was anxious also to inspect the head of the celebrated Hvalfjörð, to ascend Skarðsheiði, and to call upon the Reverend Thorvaldr Bjarnason, who had hospitably invited me to Reynivellir, his parsonage. The excursion took place about mid-July, but I again sacrifice the unity of time to that of place. My companion was Mr Martin Chapman, of New Zealand, now domiciled in the Temple: we had already made the trip to Hekla, and his good gifts as a traveller, his energy and his im-

perturbable good temper and *sang froid*, made him an excellent companion. We again secured as guide Páll Eyúlfsson, of whom more presently. Each had a remount, and a single baggage animal was judged sufficient.

We set out merrily by the eastern road, through a country now familiar to the reader, and soon covered the four miles between the town and the ford of the Laxá (Elliðaá). On the way were many signs of glacial action, grooving as well as slickensides, caused by the friction of two rock surfaces: the ice-dressings which I had last seen on Arthur's Seat are everywhere around Reykjavik. At Hr Thomsen's farm, Ártún (river "toon"), we left the inland or Geysir road and turned towards the sea. About Leiruvogr (mud bay) and the mouth of the Leiruvogsá the floor was of trachyte, which appeared even in the stream-beds: the material was heat-altered and discoloured by oxides. The little black church of Mossfell (moss-hill), a common name in the island, was the half-way house; and thence we rode up the Svinadalr (swine-vale), to the white pass of Mó-skarða hnjúkr, also called Há-hnjúkr. Here, after travelling three hours and forty-five minutes, we dismounted and prepared for the ascent.

On our left hand was a rough tooth, or *aiguille*, a conspicuous object rising perpendicularly from the rapid slope: the lower ground was the usual mixture of bog, moss, and water. This was soon exchanged for an angle too steep for vegetation; yet even on the summit, we picked scattered flowers, and the peculiarity of Iceland in the eyes of an African traveller again repeated itself. Here we find not only genera abnormally numerous compared with species, but also no change of growth from the tropical to the temperate and the polar, as, for instance, on Camarones Mountain. The same flora everywhere appears, the paucity of vegetable corresponding with the poverty of animal forms: only in the upper regions it is of course dwarfed by height and by the comparative thinness of the aqueous vapours which screen the lowlands; and for the same reason it grows and dies later in the year.

The surface of the mountain was purely trachytic, but the one material was Protean in shape and colour. The prevailing tints were red and golden yellow. We recognised the slate of Hekla

and the heat-altered material near the great Geysir. As we neared the summit the metal became flaky, like the limestone of the Syrian mountains. After forty minutes of rough climbing over slopes of rubbish—the smaller it was the firmer it proved to the tread—we reached the apex, about 2000 feet above sea-level: like the western Esja, it had the sharpest face to the north, and the crest was a saw, a spiked *arête*, palisaded and bristling with teeth and jags like the many-bladed knife of the cutler's shop.[1]

Returning to our horses, we descended one of those staircases of earth and stone now so familiar, and fell into the valley of a northern Laxá, called for distinction, " of Reynivellir " (the sorb-apple plains). The surface, so fair to sight, is swampy, despite its main-drain, and must be traversed by earthen dykes. The lower part is protected to the north by the Reynivallaháls (neck of Reynivellir), and to the south by the Miðfell (mid-mount) and other outliers of the Esja. Here many houses are scattered about; we recognise the sweet scent of hay; and the dock-fringed plots of potatoes and cabbages look exceptionally flourishing. In winter all freezes, but as the grass never protrudes from the ice, however shallow, the neighbouring farmers visit one another on skates, which are those of Europe generally.

At eleven P.M. we reached the parsonage, which showed three gables pointing southwards, and a fourth to the east. A cart and a wheel-jack gave signs that improvements were not unknown. The hour was unusual for calling, but Iceland knows nothing of these fine distinctions: the house dogs bayed the alarm; the host awoke the household; and, before turning in, we supped comfortably at the parsonage.

On the next day Síra Thorvaldr could not accompany us, having service to read. The only son of a widow, he entered

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[1] "The whole formation of the mountain (Büdös) and the surrounding cones, the sharp-edged blocks and masses of rock, heaped up one on the other, of which these consist, the apparently molten surface of the trachyte—all seems plainly to prove that it was only after the formation of these masses, and when they were in a rigid state, that a grand upheaval took place here; during which, the powerful gases from below, raising, and straining, and tearing the masses, piled them up in mighty domes and mountain-tops, tossing them about till, here and there, they had found permanent canals leading to the surface of the earth " (Frederic Fronius, quoted by Mr Bonar).

the Church at her desire, but his heart is book-hunting at Copenhagen, and, as his Sanskrit volumes show, his delight would be Orientalism. But what can be done so far from the haunts of learning? and at thirty-four he sees life gradually slipping away from him. Meanwhile he takes pupils, he farms, he flirts with botany, and he refreshes himself by an occasional visit to Reykjavik. He kindly gave me a copy of the Reykholtskirkjumáldagi, the Authentic Inventory of Reykholt Kirk, facsimile'd by the Icelandic Literary Society:[1] the three specimens bear no date, but the Sagas fix the time between A.D. 1143 and A.D. 1222.

About ten A.M. we were *en route* and, worried by swarms of flies, in forty minutes we walked up the great ugly prism, Reynivallaháls, whose winding way was hardly visible from below. The summit is dotted with Vörður, to guide travellers and church-goers through the snow. The descent turned eastward, and showed us in front the familiar forms of the horned and snow-streaked "Súlur," the massive umbo of Skjaldbreið, and the white dome of the Ok Jökull: to the left (north) was Skarðsheiði, veiled in clouds. The lower gullies, where the heavy cold air settles, condense their columns of warmer air into clouds, which simulate water-spouts: at times these vapours, wonderfully resembling smoke-pillars, have been mistaken for a rain of erupted ashes. At our feet lay the head of the Hvalfjörð, looking unusually picturesque in the still, blue air. Great double buttresses pushed peremptorily from behind. The Múlafjall (mull-hills)[2] and Síldarmannafjall (sillock-fisher or herring-catcher's hill) are separated from Reynivallaháls and from each other by Botnsdalr (bottom-head dale), and by two green vales, Brynjudalr, where the brindled cow was once lost. The river-like surface of the firth was exceptionally tranquil, and a dwarf islet, shaped like a Strasburg

[1] It is noticed in the "Mémoires de la S. R. des Antiquaires du Nord" (p. 9, vol. of 1845-49). The writer assigns it to A.D. 1143, in the days of "Are Frode" (Ari hinn Fróði).

[2] Múli (pron. *mule*) is the Germ. Maul, a muzzle, and the Scotch Mull (*e.g.*, of Galloway), the Shetland and Orkney "Mule." It means a buttress, with bluff head, a tongue of high land, bounded on three sides by slopes or precipices, and the word should be adopted into general geography. The Arabs would call this favourite site for old towns, "Zahr et Taur"—the bull's back.

THE "REYKHOLTSKIRKJUMÁLDAGI",
(INVENTORY OF REYKHOLT KIRK) AND TWO OTHER DOCUMENTS
DATE BETWEEN A.D. 1143 AND A.D. 1222.

Til kirkio liggr i reykiaholte heimaland meþ ollom landz nytiom
þar fylgia kyr tottogo · griþungr tvevetr · xxx · a · oc hundraþ ·
þar liggr til fim hluter · grimsar alrar en þriu hverfa undan nema
þat es munnu telia · þat es hlauþa garþr alr · oc þrir hluter at ennar fyr
norþan miþberg · en fiorþongr en hverfr fra · þar fylger oc
fiorþongr haorgs hyliar siþan es settungr es af teken oc ostēma
at rauþa vatsose · þar fylgia hestar þrir enge verre an xiiii aurar
þar hverfr oc til selfor i kior meþ ovefe þeirre es þar fylger at
helfinge oc afretr a hrutafiarþar heþe · oc iwc þau es han a · i fara
dal · oc geitland meþ scoge · Scogr i fandale niþr fra selakkagile umb
scala tofst · gengr mark fyr neþan or steinom þei es heita klofningar
þeir standa viþ sindalso ok þar upp at i alsbrun · þar fylger oc scogr
i þuerar liþ at viþa til sells … fiscr þri steinþorsstaþa land · galds
sæþe niþr fort · her liggia til tio hundroþ fex alna aura

vax. oc tottogo. þau liggia lond til kirkio breiþa bolstaþr.
oc raudkia land. oc hogende. her fulgra en kirkio fe fiau
kugildi i metfe. Sa er byr i raudkia holte skal annaz haftland
oc tuau kugilde bufiar meþ. þui fe skal fulgia kuen gilor
omage huer misserе. oc skal sa han til taka er i raudkia
holte byr. þesse kirkio fe er ero i bokom oc i messo fotom oc i kirkio
skruþe virdo til sex togo hundraþa vaþmala i heudr Snor
ra þeir Gizor oc þorþr. oc ketill hermundar s. oc hogne prestr
Skrin þat er stendr a altara meþ helgom domom gefa þeir Magister
Snorre at helfninge huar þeirra. oc er þetta kirkio fe umb fr
am of þat er aþr er talet i kirkia a en umfram klukur þer er þar
Snorre z halveig leoia til stadar saman meþ ... ii. z ii. arna natar
en þria solmndar natr en .vi. petrs natr z þar meþ meso fat en
betsto smelta ... sept. þessa reka a kirkia i reykia holti. vndir .pelli ...
þridiung hvalreka ok halfr i indreh i land ha ... vnd idea pelli þridi
ungr hvalreka ... i liþr i agoda. se þu ... dr. ... pelli. þridiungr
hvarr tveggia i agoda a Amunadar nesi fa ... ordungr hvalreka.
... kambi fiordungr i hvalreka. ... vi ... fiordungr i hvalreka.
... or Kalf ...
Kirkia su er stendr i reykia holti er helgud
med gudi mario modur. ... z hinum helga
petro postola. z enum helga dionisio byskupi
z henni helgu Barbare meyio.

Snorri ... v. kalfa ...
þorarinn prestr ... v. kalf
Hermundr diacn. vi kalfa ...
Ingibiorg Snorad. xii. ka.

THE "REYKHOLTSKIRKJUMÁLDAGI"
(INVENTORY OF REYKHOLT KIRK) AND TWO OTHER DOCUMENTS
DATE BETWEEN A.D. 1143 AND A.D 1222.

Til kirkio ligr iraukiaholte heima land meþ ollū landſ ny·tom
þar fy·lgia ky·r tottogo· gripungr tuevetr. xxx·a· ochundraþ·
þar ligr til fim hluter· grimſer alrar enþriu hluer fa undan nema
þat eſ munnu telia· þat eſ hlaupa garþr alr· oc þriu hluer ar ennar fy·r
nor þan miþberg· en fiorgongr en huer fr fra· þar fylger oc
fiorþongr haorgſ hy·liar ſiþan eſ ſettungr eſ af teken oc oſtēma
at rauþa vatſoſe· þar fy·lgia heſtar þriu enge verre an xuu aurar
þar huer fr oc til ſelfor ikuor meþ óvepe þeirre eſ þar fy·lger at
helfunge ocafretr ahr uta fiarþar hepe· oc uoc þau eſ han a· ufara
dal· oc geirland meþ ſcoge· Scogr ſandale miþr fra ſelakkagile umb
ſcala toſſt· gengr mark fy·r nepan or ſtēmō þēi eſ heira klofungar
þeir ſtanda viþ ſandall o· ok þar up at ialſ brun· þar fúlger oc ſcogr
ihuer ar liþ at viþa til ſell· fleiri þr iſtempoſſtaþa land· Haldſ
ſæpe niþr fort. her liggia til kirkio hundrop fex alna aura
i bokō oc i meſſo fotō oc i kirkio i krupe eyſyr [illegible] rtan kiukkor
þeir eroumuþar. Magn oc hallfriþr gefa til kirkio roþo krooſſ oc lic
neſke þau eſ ſtanda ufer altara. ocbuneng a plenacio. þat eſ kirkio
fe umb fram of þat eſ aþr eſ calt. kirkio fe fylgia tuer merer
vax. oc tottogo. þau liggia loud til kirkio breiþa bolſtaþr.
or raukia land. oc hogende. her fulgra eh kirkio fe ſiau.
kugilde i metfe. Sa eſ bur iraukia holte ſkal aunaz haſſland
oc tuau kugilde bufiar meþ. þui fe ſhal fylgia kueh gilor
omage huer muſſere. oc ſkal ſa han til taka· eſ i raukia
holte bur. þeſſe kirkio fe eſ ero i bokō oc i meſſo fotō oc i kirkio
i krupe pirdo til ſex togo hundrapa vaþmala i heudr Snor
ra þeir Gizor oc þorþr. ocketill her mundar ſ. oc hogue þſtr
Skrin þat eſ ſtendr a altara meþ helgō domō gefa þeir Magnee
Snorre at helfunge huar þerra. oceſ þetta kirkio fe umb fr
am of þat eſ aþr eſ talet i kirkia aeh ūpra klukur þer er þar
Snorre z balveg legia til ſtadar ſang meyiar. ii. z ii. arna navtar
en þa ſolinndar uatn en. vi. peiſ nater z þar nied meſo þat en
betſto ſmelta ē ar. ii. ſepe. þeſſa reka a liggia i reþkia holltu. ynd ir. pelli þr
þridiūngr hvalvrka oh halfr indreh z land ha lxx. ynd idra pelli þridi
vngr hvalreka z light iagoda· ſē þu dm. þr pelli. þridiungz
hvarr tveggia iagod a· Amunadar neſi fa ordungr hvalveka
Alt kambi fiordungr i hvalveka. Jhyrgſt. vi. h fiordungr i hvalveka.
Kirkia su er ſtende i reykia holtu er helgud or kalfe
með guði maríu moður. dē. z hinū helga Snorri ſt. s. v. kalfa ſkin
Petro pſta. z enū hælga diomſio bpi þorarinn þ baſſ. s. v. kalfa ſkin
z henni helgu Barbare meyio. þermd diacn. vi. kalfa ſkin
þngibiorg Snorad. xii. ka.

pie, rose from its own reflection. There were other islets, and boats, and eider-ducks temporarily separated *a mensâ et thoro*, screaming "crees," peewits, plovers, and the usual accidents of a firth-view in Iceland.

At the foot of the descent we struck the Fossá farm, and rode along the northern counterslope of the Reynivallaháls. The path ran over swamp and rock; it was the *malus passus* of the whole line, but by no means dangerous as described by Geir Zoega. Fortunately the tide was out, and we easily forded the mouths of the Brynjudalr and Botnsdalr; on our return we exchanged the bad line for two long detours rounding the forked head of the firth. We then ascended to a farm situated under the Thyrill, or egg-kipper, the stick for whipping eggs, milk, or porridge. This remarkable feature forms the westernmost head of the Síldarmannafjall, and resembles nothing so much as two towers flanking the gateway of a giant's castle, built after the fashion of Normandy; the superstructure is basalt, and time seems to have tilted it a little awry, as if the proprietor had long been an absentee. This Thyrill takes its name from the mountain gusts which hurl men from their horses, threaten caravans with destruction by frightful whirlwinds, and raise sheets of sea-water high in the air, tearing them to pieces like snow. To look at the peaceful innocent scene we could hardly imagine that it ever lets angry passions rise, or that it had been led to the excesses and atrocities described by Ólafsson and Von Waltershausen.[1]

The farm-people leaned against the walls, sunning themselves like Slavs under similar circumstances; there was no want of church-goers riding to and fro, and generally the travellers were more civil than upon the beaten paths. Iceland mostly reverses the rule of the world, the country folk being less amiable to the stranger than the town folk. From the Thyrill to the Ferstikla farm, a distance of an hour and a half, there are two paths. The

[1] The late Mr Piddington tells us that the Hvalfjörð district is "called by the neighbouring inhabitants *Veðra-Kista*, that is, box or chest of winds, which implies that this inlet is, as it were, the abode of violent storms." He gives cyclones to Iceland, where there are none, and he corrects Uno Von Troil (p. 41) who rightly makes the name "Storm-coast (Veðra-kista) to be given to some places in Iceland."

short cut lies along the shore of heavy dark sand and rocky points of black basalt studded with white shells; the porous material is in parts full of almonds of lime, hence the white coating which we here observe, as in the Wadys of the Haurán. The inner line is the usual mixture of warty surface, swamp, stone, and shaking bog. At Ferstikla, where a path strikes north for Reykholt, we found some grass and rested the ponies.

A couple of hours finished the ride. We turned left, over a shallow divide, the Ferstikluháls, whose northern counterslope is wooded with birches fully two feet tall, yet hardly equal to the task of pulling us from our saddles. We then fell into another Svínadalr (swine-dale), with three lakes disposed north-east to south-west, along the southern base of Skarðsheiði, and drained by another Laxá. There was no lack of farm-houses, a sight which cheered the nags whilst floundering through the deep mud-bog. A guide whom we had engaged *pro tem.*, pointed to the cone of the Blákoll, a comparatively low formation to the right; but the vaunted mountain with its stepped bluffs is everywhere easy, and "climbing for climb" always suggests to me the African's "drinkee for drunk." After a pleasant but very slow ride of seven hours, we made, at 7.30 P.M., the Skarð farmlet. After the muggy morning with a "rain-sun," followed by a chilly evening which threatened a down-pour, we were not sorry to be lodged in the cow-house of a "Sel"[1] and to sleep upon sweet-smelling hay, far preferable to the animal heat of the foul cubicula.

This day we have passed over the Iceland terminus proposed by the Danish telegraph line. Despite the fearful whirlwinds, described as capable of breaking "tegulas imbricesque," and the rocky bottom of the Whale Firth, it is perhaps the best; it is absolutely free from icebergs (Fjall jakar), floes, and field-ice (Hellu-ís): Arctic ice appears in the Faxa Fjörð and about Rey-

[1] The Sel, which often occurs in Icelandic names, is the German Senn-hütte, a shed, or little farm-house, in a mountain-pasture. The A.S. Sele probably re-appears in our north-country "Shiel," a small shooting farm. In Norway such huts are called Setr, or Sætr, the A.S. Sætar: hence Sumur Sætas (dwellers in summer huts) became our Somerset. Iceland wants the cold arbour (Ceald here-berga = Kaltern herberg of old Germany), the bare-walled lodge, or "Traveller's bungalow."

kjavik only about once a century, the last time being 1763. Here the bay-ice is reduced to a little brash-ice and shore-ice, which are of scanty importance. It is a lee-land defended by the south-western projection and by the north-western digitations from the berg-bearing currents; and the bottom, until the Hvalfjörð is reached, appears to be sand and mud. As Forbes remarks, there is no "eligible spot" for a station between Portland (Dyrhólaey) and Reykjanes; whilst the submarine volcanic line of rocks, the passage of steamers, and the shallows of Reykjavik, render that port impossible. The Vestmannaeyjar again are too far from the capital, and the east coast is simply not to be thought of.

The project is part of the "north-about line" of Atlantic telegraph, as opposed to the "south-about," viâ the Cap de Verds, St Paul's Rock, and Brazilian Cape St Roque. Many of us remember hearing it ably advocated some dozen years ago by Colonel T. P. Shaffner of Louisville,[1] Kentucky, who took it up in 1853; travelled to Labrador, Greenland, and Iceland; advertised, expended time and capital, canvassed, obtained concessions from Denmark, Sweden, and Norway, and published and lectured before the Royal Geographical Society, in order to raise a fund of £400,000. The time was propitious. The first attempt of 1857-58 had broken down after sending some 400 messages: in 1860 the longest sub-aqueous circuit was 750 miles. No. 2 cable (1863), carried by the "Great Eastern," had also failed; and Mr Faraday objected his "retardation" and "return currents," even to an air-line of a thousand miles. The bankruptcy of Transatlantic telegraphy was therefore confidently predicted; nor was it believed that any section of 2000 miles could possibly be made to last. Presently, by way of a practical jest upon scientific hobbies and croakings, the third cable (1866) succeeded: then came the Valentia-Newfoundland in the same year; and lastly, in 1868, the Brest and New York, or French line. Now (1872) a fourth is talked of, and the next half-a-dozen years may see another half-dozen.

Colonel Shaffner, who is well remembered in eastern Iceland,

[1] The North Atlantic Telegraph viâ the Færoe Islands, Iceland, and Greenland. London: Stanford, 1861.

proposed to cross the Atlantic by four stations, none exceeding 700 miles—namely, Scotland to Færoes (225-250), to Iceland (240), to Greenland (600-700), and to the coast of Labrador (510); a maximum total of 1700, afterwards reduced to 1645 miles. The project, however, contained two elements of unsuccess. Firstly, it proposed an air-line from Djúpivogr (east coast) to the capital: I do not know what my friend Dr Rae, who was sent to inspect the route, reported; but the universal opinion of Icelanders is that no telegraphic communication of the kind could resist a single winter-storm, not to speak of earthquakes and eruptions. "How repair the damage?" they ask: "how even carry the posts?" The second objection, the state of the ice about the Greenland coast, was perhaps even more fatal. Thus the scheme gradually fell into oblivion, not, however, before it had done right good service in exploring Newfoundland—a very paradise for anglers, where trout weigh 6 lbs. and where salmon sells at 4 cents. The persevering Danes still cleave to a connection with Iceland, and that is why we saw the gun-boat "Fylla" on her surveying cruise.

On the next morning, as the peasantry rose at three A.M. to ted their hay, we began preparations for ascending Skarðsheiði (scarf-gap-heath) by observing the aneroids.[1] Rain evidently threatened, as at A.M. 7.15 we attacked the slope of *débris*, green only where two trickling streamlets played hide-and-seek under moss and stones. After an hour's walk we reached the first ridge, and found in front of us a broken plateau about 2000 feet high, with five lakes and ponds distributed at different altitudes: the waters are all sweet, percolation taking the place of drainage. On our right rose a tall precipitous wall of receding steps, which at a distance resemble string courses and stories. The precipice is streaked with *couloirs*, very well disposed for falls and cannonades of rocks: high up there are two broad Palagonite bands in the trap, which may sometimes be seen from Reykjavik. Our guide the farmer did the honours of the echo.

[1] At the farm-house the mean of three observations taken before setting out, and after return, gave 29·60, th. (F.) 71°; summit of first ridge, 27·65, th. 87°; top of mountain, 26·60, th. 77°.

We now circled to the north, winding round the grim wall, up and down ridge after ridge of moraine-like *débris*, and over moss-clad boulders, among which we occasionally sank up to the knees. Here the most conspicuous growths were reindeer moss and Fjall-grös ("mountain grass"), the *Lichen Islandicus*, of which Felligrath sings:

> "Old, even in boyhood, faint and ill,
> And sleepless on my couch of woe
> I sip this beverage, which I owe
> To Guper's death and Hecla's hill."

In Iceland I never heard—as old travellers relate—of its being dried, put in bags, beaten, and worked into flour by stamping. Usually it is boiled, and eaten with barley like burghoo, or it is infused in milk, as cacao and maté sometimes are: it gives a light tinge of green, and a very pronounced mucilaginous flavour. The simple old days used it as coffee, but it could not stand its ground against the intruder which arrests the waste of tissue, as well as warms the blood. "Iceland grass," however, is still valued at home as a jelly for *poitrinaires;* and the last time I saw it was on the Campo-grosso or Dolomite mountains of Italian Recoaro (Vicenza).

After a second hour we reached the north of the bluff. On our left hand was a red and cindery mound, the Stellir,[1] justly famed as a landmark for sailors: ahead, and to east, rose the detached Skessuhorn, which seemed to present no difficulties: it was not till our return that we heard it described as a local Matterhorn, often attacked, but attacked in vain, and still awaiting its vanquisher. Turning to the right, we worked up the quoin by a passage between stone walls of Nature's make, and in another half-hour we climbed up the stiff slope of decayed trap. Our guide required some little management: he pointed in alarm to the mists rolling up from the north, with a cruel rush of cold air, and though the line was marked with stone-men, he ejaculated "Thoka!" (fog). "Lost in the mists" is often a conclusion to a "tale of Iceland's Isle."

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[1] From að stilla, to fix a position.

The summit of Skarðsheiði, about 3000 feet above sea-level, resembled that of the Esja, and afforded a view quite as extensive, though not now so novel. To the north, under our feet, ran the winding Hvitá and its outlying waters, draining to the Borgarfjörð, here a grisly "spiegel," dotted with black reefs. North-eastwards lay the bare sulphurous grounds of Reykholt (reeky hill), while far to the north-west, bounding the north of the Faxa Fjörð, the knuckles of Snæfell and the caldrons popularly known as Katlar, the kettles, formed the land horizon. Southward the view ranged clean over Reykjavik, and showed the easiest route to Skarðsheiði: this would be by boat to Saurbær, north-east of Akrafjall, whence a walk of five miles places the traveller at the Skarð farm.

The ascent and descent had occupied four hours: we then mounted our horses, and returned before night to Reynivellir.

A delightful morning (July 23), when the air was so fine, so clear, so bright that

"It seemed a sin to breathe it,"

a morning when one really would have been sorry to die, sent us to bathe at the Reynivellir brook, regardless of slugs and snails, moths and flies. The Reverend left, after a copious breakfast of mashed salmon, with a promise to meet us on the road. He had just lost a parishioner. Since July 11th there has not been a shower, and the sky was that of Italy for a whole fortnight. This abnormally fine weather is equally fatal to the very young and the very old: seven or eight deaths had just taken place at Reykjavik, a large proportion out of an annual average of sixty; and three successive days saw three funerals: the causes are "pituita," malignant catarrh, and influenza.

We were threatened with a *mal pas*, and again found it remarkably good. From Reynivellir the path ran down the Laxá valley; and where we crossed the stream, it was clear as crystal, and abundant in trout. Here, again, turf has invaded lands once forested; and now we look in vain for a specimen of the sorb-tree, which named the parsonage. *Chemin faisant*, the Reverend lectured us upon the botany of his native vale. The Dutch or

white clover (Smári)[1] flourishes: that red-headed cannibal the Lambagras, moss-campion or dwarf catch-fly (*Silene acaulis*), which rises upwards of 11,000 feet on the Swiss Alps, here prefers the drier soils. The lower lands are covered with the Gúnga-gras ("bag grass," *Bursa pastoris*), everywhere common, with the meadow-sweet (Mjaðurt = οἰνομέλι, *Spiræa ulmeria*), which yields a yellow dye, and a grateful perfume in hot weather. The pride of the plain is the thrift or sea-gilly-flower (*Statice armeria*), with downy stalk and pale pink heads, which the people call Geldingahnappar, "gelding," that is to say, wether, "button." The richer and damper grounds are grown with the marsh marigold (*Caltha palustris*), the Solia or Solveia of the Færoes, here called Lækja-sóley or hóf-sóley, from its hoof-shaped leaf; cattle will not eat it, save as a *pis-aller;* the small green flower-buds when pickled resemble capers, and the inflorescence lasts from early May to the end of summer. It is a congener of the carnivorous *Caltha dionæafolia.* There is an abundance of the Engja-rós, eyre or meadow rose (*Epilobium augustifolium*), forming a pink carpet—there are many rosaceæ in Iceland, but roses are deficient, as in the southern hemisphere, only one having been found;[2] and the traveller must not expect to find the beautiful little "Ward" of the Libanus. Another common growth is the leguminous Um-feðmingsgras, "holding grass," the tufted or creeping vetch (*Vicia cracca*), whose cirri fasten upon neighbours; hence the Færoese call it Krogyogras, from Kroya, to cling. The solitary *Andromeda hypnoides,* a small creeper, with heather-like white flowers, acts lily of the valley. We are again reminded of Syria by the chamomile-like Baldursbrá (*Anthemis cotula*), whose snowy petals suggest the White God,[3] Baldur the Beautiful, and whose circular yellow

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[1] In the Shetlands called Smora, from Dan. Smör, butter, because it gives an abundance of cream.

[2] Hooker, ii. 325.

[3] The Mexicans also had a "Fair God," Quetzel, beautiful as Baldur, and, better still, averse to human sacrifices. The popular tradition, that some day he would return from the east and rule the land, made Montezuma recognise him in the blond-haired Cortez: the great explorer and conqueror, however, did not prove a satisfactory Quetzel. Of these white gods and foreigners from the east, even in South America, I have treated fully in my notes to Hans Stade (Hakluyt Soc.), part ii., chap. xv.

centre assimilates it to the solar orb—it is too bad to call it "stinking camomile." The common sorrel (*Rumex acetosa*, locally known as Valla, or Korn-súra) is a social plant that prefers the neighbourhood of farms, and flourishes in newly-manured túns: the other species are the kidney-shaped mountain sorrel (*Oxyria reniformis*) and the sheep's sorrel (*R. acetosella*). In the more southern islands, where the root gives a red dye, the leaf is said to grow a foot and a half long; it is used to flavour bird soup, and is eaten with meat. An anti-scorbutic, pleasant withal, it should here be used every day, as tomatoes are in the southern United States; but if you advise the Icelander to correct his blood with sorrel, he will probably reply that it is food for cows.

After an hour's ride, including the inevitable short cut of wrong path and turning back, we reached the Miðfell farm, which faces cosily west, and is backed by its little range of trap so degraded that it seems to be forming humus. Fronting it is the Miðfellsvatn lakelet, which drains the north-eastern Esja: it swarms with the Sílungur trout, but there was no boat for the convenience of fishermen. Whilst the Reverend went to his funeral, we sat upon the grassy warts, and enjoyed the view of Snæfell, bluish-white in the flickering air. The thermometer stood at 86° (F.) in the sun; and the ghost of a mist tempered, like the glazing of a master-hand, the raw colours and rough forms of the scene. The prospect suggested Tempe, not the grisly defile of reality, but the picture painted by poets—Greek Greece and Syrian Syria contrast wonderfully with the features which naturally form themselves in the northern mind. We argued that a couple of pleasant summer months might be spent at Miðfell, but that such æstivation would involve building a fishing-box and stocking it with friends.

Not the least picturesque part of the prospect was the cavalcade of some thirty men and women returning in Indian file from the funeral. At last, wearied with waiting, we rode up the ugly rough ravine of Eilifsdalr, and turned to the right between the Esja and its northern outlier, Eyrarfjall. The latter showed sub-columnar and fan-shaped basalt in the foundations, with Palagonite, here yellow, there dark, overlying and underlying

trap, whilst striated rocks everywhere appeared. On the left hand, or under Esja, were mounds mightily resembling moraine:[1] they were probably formed by the streams of frozen mud which carried with them boulder fragments, and either strewed them upon the plain or swept them out to sea. The most conspicuous of the natural tumuli, and crowned with a stone, is called, 'Róstuhóll,[2] "battle holt," or, as Hooker has it, "duel hill:" here Búi Andriðsson, for whom see the Kjalnesinga Saga, kept his foes at bay, and slew half-a-dozen with a sling.

We then forded the streams, and crossed the nasty swamps and the stony patches of the brook which flows to the Hvalfjörð. Farms were scattered everywhere about the sheltered valley. After two hours and a half of slow progress, we were joined by the Reverend, who, gallantly mounted, rode straight as a fox-hunting parson of the last generation, and we soon reached the ladder of red and green lavas which overlooks the firth. The immediate banks show the feature locally called Melar-bakki,[3] horizontal lines bare of earth, regular as if heaped up by man, and generally with inclines too stiff to retain vegetation. We shall see the feature well displayed at Borðeyri and Grafarós. In Canada, and New England also, where the snow covering, which prevents radiation of heat, is blown away by winds, and the ground is frozen for a depth of two feet or more, the surface remains brown and barren throughout spring and summer.

Here we dismounted to collect the "Yaspis," for which the place is famous, and which we had found scattered over the Esja range. The colours are bright red, blue, and blue-green, often prettily striped and branched; the sharp edges cut like obsidian, and the whole appears as impure opaque masses of quartz. According to Dr Hjaltalín, it remarkably resembles that of Hungary, and the dark spots upon the surface are oxide of

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[1] The word was taken from Chamounix by De Saussure. It is not, as Petermann says, the *detritus* or rubbish heaps from the bottom and sides of the glacier or ice-fall, but the *débris* of the rock above it.

[2] This is the popular form of Or-usta, battle.

[3] Melr, a sandy hill, and especially a bare bank of sand and stone, familiar to Iceland travellers, has been explained in the Introduction (Sect. VII.). Baring-Gould (p. 284) would derive it from a root signifying to grind; Holmboe from Myldja, to dig, or from Mold, loose earth. Bakki is a bank or ridge, opposed to Brekka (brink), a slope, a hill.

copper, copper glance, or argentiferous copper. Zeolites were abundant, so were almonds of lime in basalt; chalcedonies, milk-white, red, yellow, green, and dark-brown, passing into cachalong and grades of chalcedony and quartz, "cloisonnés" with crystals of carbonate of lime, and superficially clad with capillary mesotype. We often heard in Iceland of the noble opal, which might be expected in a volcanic land—as at Aden, there are whole sheets of it, but none is noble. The Færoese consider it to be a transition between zeolite and chalcedony: I was told of fine specimens found there, but failed to see them.[1]

We then trotted merrily past Saurbær (sour mud or dirt-farm; perhaps farm of Saur), and were shown the Tíða Skarð (tide or hour *col*), so called because the congregation riding to mass could be seen when an hour distant. The path along the shore was tolerable, and we had to dismount only at a single swamp. After a total of four hours' slow progress from Miðfell, we reached the main object of our journey, the celebrated Hof of Kjalarnes (Keel-ness), in the Kjósar or "choice" Sýsla. It was the great place of assembly in the south-west, and the chief of the twelve provincial "Things" before A.D. 928, when the Althing was removed to the confiscated estate of Thingvellir. We expected interesting ruins after reading of "Kialarness, remarkable for the remains of a Hof or idolatrous temple erected towards the close of the ninth century" (Henderson, ii. 3). The Crymogæa of "Arngrim Jonas" speaks with admiration of two Hofs in the north and south of the island. Each had an inner sacellum, or holy of holies, where the victims were ranged in semicircle about the idol-altar (Stalli): the latter was plated with iron, for protection against the pure, flint-kindled fire, which, as in a Parsee temple, perpetually burned there: it supported a brass bowl (blót bolli) to contain the blood, sprinkled with the blood-twig (blót grein) or asperges upon the bystanders. There hung up, likewise, a great silver ring, which they stained with blood, and which whoever took an oath on these occasions was

[1] This stone, like the diamond, threatens to lose more than half its value, if it be true that the State of Queretaro in Mexico has lately (1874) yielded "opals of the first quality, and of all varieties; the milk-opals, fire-opals, girasols or 'harlequins,' and the richest Hungarian or precious opals."

required to hold in his hand. The "Baugr," we are told, weighed two ounces, and was at times worn by the priest: it possibly symbolised Odin's magic "Draupnir," made by Brokkur, most skilful of the dwarfs. Till late years a specimen was to be seen at the Reykjahlíð churchlet. The "oath on the ring" was taken by dipping it in blood, often human, and by saying, after the solemn adjuration of heathen old Scandinavia, "So help me Freyr and Njördr, and that almighty Áss!" (ok hinn almáttki Áss, *i.e.*, Thor);[1] and Norsemen of rank were buried with the Armilla sacred to Odin. "In one of these temples there was also, near the chapel, a deep pit or well into which they cast the victims."

Mallet, and other trustworthy authors of his day, assimilated the ancient Scandinavian places of worship to those of the Persian Guebres and the old Teutons, who would not offend the gods by immuring them, or by roofing them in, which is not correct. The Hof was an enclosed building, whilst the Hörg, in whose centre stood the huge sacrificial stone, was open above. The Scandinavian temple, even that gold-plated wonder of the North, the fane of Thor at old Upsala, was nothing but a long wooden hall to contain the worshippers, with a sanctuary at one end, the true Aryan Estika,[2] where the "Blót,"[3] or pagan sacrifice, was performed by the priest or pontiff (hof-goði). The same was the case with the Kjalarnes temple, a rough timber building, burnt by Búi Andriðsson, the slinger.

The situation is right well chosen for effect. This Hof stood

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[1] The word Áss, *pl.* Asar and Æsir, is explained by Jornandes, "Gothi proceres suos quasi qui fortunâ vincebant non pares homines sed semideos, i.e. *Anses* (Ans in Mæso-Gothic) vocavere." Suetonius makes Æsar an Etruscan word which meant God (probably a plural of Kelt. Es). We find forms of it in the Mongolian dialects, and in the Aryan, Sanskrit (Asura), Keltic, Teutonic (Æsir), German (Anshelm, p. n.), and even in the English Osborn and Oswald. *As* appears to correspond with the Semitic *Al*, but the word is still involved in mystery.

[2] The Hebrew Esh and the Chaldee Esha (fire) are synonymous with the Aryan Is, whence Isti, an offering on the hearth, and Estika the place of offering. Hence the Greek Hestía, fire, hearth, stove, and, with digamma, the Latin Vesta when worshipped as Genius or Lar familiaris.

[3] Blót (or Forn), a sacrifice of men and beasts, horses and oxen, swine and sheep, must not be confounded with Blóð, blood. The Blót-steinn or sacrificial stone, which acted as our gallows, is described as of "oval form and a little pointed at the top," which suggests the Moab-god Chemosh, it stood in every Thing-field, a place adjoining the Hof. I did not remark that the site of the temples always faced south, as Mallet says. The Öndvegi, or high-seat of the hall, was "on the side of the sun," *i.e.*, south.

at the base of a stony land-tongue separated by swampy ground from the iron shore, lined and faced with *diabolitos*, or cruel little black rocks. Opposite sleeps the tranquil bay of Reykjavik, backed by its picturesque blue hills—a veritable Sierra, the backbone of this part of Iceland, all cones and pyramids, notches and saw-like teeth, resembling the sky-lines of El Safá. To the right is a rough rise of lava pushing out jagged points, and to the left towers the Esja pile, with its network of dykes and slides, an extinct Vesuvius faced by white cliffs. Farms and hay-fields are scattered about, probably occupying the same positions which looked upon the ancient heathen gods, with whose departure prosperity left the land. There is not a trace of the building, but the pasty-faced peasants showed us, below the rise, a bit of deep swamp covered with marsh-marigold, and this they called the Blót-Kelda, or victim well—possibly where men and beasts were sacrificially drowned.

After inspecting this humble marvel, we shook hands with the Reverend, and took boat for Reykjavik, where we arrived at 9.30 P.M.

I afterwards was shown the traditional site of the Thór Hof near Stykkishólm; and the utter absence of sign made me neglect to visit that of Vopnafjörð, whose door was translated to the church, the Hörg, at Krosshólar; and the fane of Goðaborg, with its sacrificial stone where "David of the wilderness" dwelt. In 1770, Uno Von Troil (Letter XVI.) offered a tempting list of northern antiquities, some of them possibly pre-historic or proto-historic.[1] But except in cairns, tumuli, and the kitchen-middens mentioned in various places, especially that near

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[1] He specifies the ruined castle near Videdal (Viðidalr), some 200 perches in circumference and 20 fathoms (?) high on the north side; another castle near the parsonage Skaggestad at Laugarnaes; remains of heathen temples at Midfjörð, Godale, Viðvik, etc.; the ancient place of execution at Hegranaes; pagan burial-places, like that of Thorleif Jarlaskáld's in the Oxerá island, which yielded old swords and helmets; two Bauta-steinn, great standing stones (Menhirs?), on the heaths of Thingman's and Threkyllis, "which probably, according to Odin's regulations, were monuments to the memory of deceased persons;" the grass-grown mound of Reykholt, "said to be raised from the ruins of Sturluson's house;" the Sturlunga Reitr, or burial-place of his family, and forty small figures of brass representing animals and other objects found near Flatey: "unfortunately they fell into the hands of people who did not know their value, consequently they have all been lost" (p. 189).

Snorri's bath at Reykholt, I should expect little yield even from the spade.

The older Edda (Sigrdrífumál, st. 34) speaks of cairns—

> "Let a mound be raised
> For those departed;"

and we shall pass not a few during our journeys. It would be interesting to know if any of them have the long adit, the vestibule, and the separate chambers for the dead, which are characteristic of the Mongolian tomb-temples, and of which a splendid specimen is found at Maes Howe.

CHAPTER X.

NORTHWARDS HO! TO STYKKISHÓLM AND GRAFARÓS.

PART I.—STYKKISHÓLM.

WE are very anxious to leave this

"Tivoli del mal conforte,"

where,

"O piove, o tira vento, o suona a morte."

The "Jón Sigurðsson," Captain Müller, ran into Reykjavik on June 26, and next day we set out to prospect Hafnafjörð, the Haven Firth, distant two bays south of the capital. Threading the now familiar islets, we doubled the beaconed point of Suðrnes, and passed Bessastaðir, Besse or Bear-stead, a place not undistinguished in island story. It was built by the turbulent and traitorous "Herodotus of the North," Snorrí Sturluson, grandson of Sæmund the Wise, born at Hvamm, in A.D. 1178, and author of the "prose Edda;" he died "in his shoes"—murdered as was the custom of the day. Long years afterwards the place of "Meister Petz"[1] became the Latin School, and now it belongs to a congenial soul, Hr Grímr Thomsen. Followed Garðar, also on the Alpta-nes (swan-ness) peninsula, where a fringe of farms

[1] This popular German expression is evidently the Scandinavian Besse, for Berr or Bersi = Bär, a bear. Besse, again, has a suspicious likeness to the Yakut "Ese," the most respectful term in the language, = grandfather or monseigneur, applied by those Siberian Mongols to the great white bear, their most formidable foe. Bruin in Gothland being the "king of the beasts," to do a thing with Besse's leave is equivalent to doing it without leave. The quaint quadruped is much noticed in folk-lore; "Mishka" is his pet name in Russia; "Berengarius" is derived from the French Dan Beringer; and Ephraim and Ole Cuffey are well known in the U.S. Persia abounds in tales about his wearing a turband and riding asses.

R. F. B. *delt.*

SNÆFELLSJÖKULL FROM THE NORTH.

and houses, each with seven gables or more, ranged in line, not massed together, fronts the faint-green land, and prospects the glaucous northern seas. After a couple of hours, which covered two Danish miles, we steamed down a deep and sheltered sinus, facing the north-west, with double entrance: here a red buoy made us independent of pilot; the tides inflow by the south and race round and out to the north.

The scenery of Hafnafjörð, which Scotchmen compare with that of Scalloway, is peculiar and somewhat grotesque. Like all the south-western parts of Thule, the formation is a hopeless lava-field, bristling with shrublets and patched with green: the outline of frontage consists of points divided by bays of dark-grey sand, and the habitations are perched between the knobs and turrets of the several Hrauns, old and new. The land is comparatively level, backed by a veritable Sierra—the dorsal spine of this part of Iceland—jagged, notched, and vertebral, extending from north-east to south-west. Four brigantines and a lugger were anchored in the clear water, off the five pierlets, the usual planks and caissons, that denote the corresponding comptoirs, one patch of building to the north, another to the south, and a third at the bottom of the bay, whilst an extensive farm-house rose from a dorsum of green, the Hval-eyri or whale strand.

Whilst the steamer discharged her salt and iron pans, we hailed an old, blunt-snouted punt, and paid for the service two marks: the latter process evoked a stare of surprise and a vigorous shake of the hand. I note this proceeding because it is not unusual on the coast of Iceland; it certainly distinguishes the boatman from his hateful brotherhood in more genial lands; especially on the "Hesperian strand." We landed at Flensburg, about the bottom of the bay, the establishment of Hr Johnsen, and walked round to the buildings on the north. All are timber, coloured grey or black, with white windows and slate roofs; each flies its flag, Danish or Norwegian. The latter belongs to the Bergen Company, which has lately taken the place of the Scotch house at Reykjavik, with branch agencies here and at Stykkishólm and Seyðisfjörð. At a little bridged stream women and boys were busy with the corpses of cods, cutting gills, tear-

ing out gullets, splitting bellies to their ventral fins, extracting livers and sounds, and tossing the trimmed carcases into heaps —they were jolly as Italian peasants at the Vendemmia. Some of the lads were fishing with sinkers of stone, floats of driftwood, and bait of cod. Beyond the stream a new road to Reykjavik was being made, by blasting the lava—as will be seen, it is much wanted. On the north of the bay we inspected the remains of Hr Sivertsen's dry dock, which looks like a line of groins to keep the shore *in situ*. A couple of eaglets were shown for sale; they had lately been taken from a crag in the lava-run to the south-east: the chickens, hardly six weeks old, were about the size of Cochin fowls; their skins showed bare through the growing plume of grey and dark-grey, contrasting with the bright yellow cere, and they opened threatening gapes at the stranger. The price had lately risen to £3, whilst ten shillings a head were asked for the fierce little graveolent foxes.

As usual we had time for a walk inland to the Varða, or land-mark, bearing magnetic east of the ship, and distant about thirty minutes: I was anxious to see the behaviour of the lava. Travellers in Iceland everywhere speak of vast outpours which, instead of showing any decided point of origin, appear to have sweated from the soil. They especially quote the lands about Mý-vatn and Krafla, where the contrary is the case: the same has been observed in other volcanic countries, *e.g.*, by Mr Porter in Syria; by Messrs Tyrwhitt-Drake and Palmer in Moab; and by those who have studied the Quito platform. Here, however, we distinctly traced three craters, and it became evident that the mouth which discharged the oldest torrents may have been obliterated by subsequent eruptions. The principal lava-bed [1]

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[1] It supplied the Hafnafiordite of Forchhammer, leek-green, light, porous, and friable pumice-tuff, containing the following proportions:

Silica,	35·89
Alumina,	27·36
Protoxide of iron,	14·41
Lime,	10·86
Potash,	9·00
Sulphuric acid,	1·55
	99·07

Dr W. Lauder Lindsay remarks, "The sp. gr. is usually 2·729; it appears to be a lime-oligoclase, belonging, therefore, to the Felspathic family of minerals."

From a Photo.

M^c Farlane & Erskine, Lith^rs Edin^r

HAFNAFJÖRÐ, WHICH OUGHT TO BE THE CAPITAL OF ICELAND.

showed in section a shallow dome between two lateral fissures, where contraction of the edges, and perhaps a less solid foundation, had caused the sides of the stone-river to fall away and form dwarf "Gjás," or longitudinal rifts—we shall see the same action on a grander scale at Almannagjá. The dorsum was broken by sharp edges, the tall crests of split and splintered blisters, the bubbles of the earth where lava overflowed wet ground; coils like tobacco-rolls and ropy corrugations, ripple-marks and plications, showed where the hardening clinkers had been compacted together, and everywhere yawned tunnels and caverns. Yet the field was crossed by a horse-path.

The normal high shingle-bank of the shore formed an inland bog, and the result was a subtending lagoon, as usual without outlet. Farmlets were scattered about, all apparently on made ground. There was a tolerable turbary haunted by whimbrels and loud-voiced terns; the lava-fields belonged to the Snjotitlingue, snow-flake or snow-tit (*Emberiza* or *Plectophranes nivalis*); to the Stein-depill or wheat-ear (*Motacilla œnanthe*); and to the Máriátla or Mary-bird, the white wag-tail (*Motacilla alba*). The three latter were exceptionally tame, and like João de Barros in the Brazil, amused themselves by flirting with the unfeathered biped.

I have described Hafnafjörð at a greater length than it perhaps deserves. Here not a few travellers have declared that the capital of Iceland should be, and undoubtedly it will become the sole place of export for the Krísuvík sulphur-fields. The harbour is exceptionally safe, sheltered from all winds: the climate is better than that of Reykjavik; and the sky is often clear when heavy clouds invest the northern heavens. But unless ground is made, there is little or no building room. On the other hand, for an exporting port, Hafnafjörð is perfect. In the early sixteenth century the British corsairs, numbering some 360 souls, had formed a regular colony at Haven Firth—let us hope that the complaints of Christian II. will not call for renewal, when the English miner shall spread himself over the land.

As the sun fell towards the horizon the air became cool; the thermometer on deck showed 58° (F.), and the day gradually assumed a worn and faded look, like a maiden when the sun

breaks upon a ball. Before midnight we were once more at Reykjavik, to start north on the next morning.

The "Jón Sigurðsson" (det Islandske Handelssamlag's Dampskib) belongs to a Norwegian company, who bought her at the high price of $60,000. An iron hull, her draught is 9 feet, her tonnage 460, and her horse-power 80, which can be raised to upwards of 100: she must burn 12 tons of coal during the twenty-four hours to average less than 8 knots, and this combined with cheap passages prevents her paying.[1] Her good point is the possession of two donkey-engines, the simple Cornish, with 6-inch stroke, which do all the work. Her accommodations are not complete; we occupy the seven sofas in the aft saloon, and of the four cabins three are taken by the officers, including the agent. Broad, tubby, and high out of the water, she catches the wind with her "gawky" telescope funnel, a survival from the days of Watt; she has little sailing power, and she is hardly safe off a lee-shore; in August she was beaten back when attempting to make the Færoes.

The want of punctuality again is a serious disadvantage to "Jón." The departure will be fixed for any hour between six A.M. and two P.M.; you will be hastily summoned on board at nine A.M., and yet not start till noon. There are stated hours of feeding, but they are not regular enough for passenger ships; and provisions, as well as liquor, often run short, because the "restauration" is not obligatory. The delays are ever recurring; covered lighters being unknown, and rye, with other perishable goods, cannot be landed during rain. Again "Jón" is over-officered. Besides captain and two lieutenants, we carry double engineers who speak English; an agent and commissaire; steward, stewardess,

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[1] Passengers to Hafnafjörð paid only 2 marks (7d.). The nine days to the north and back were the cheapest known to me—$9 (=£1) each way, and for living £4, a total of 13s. per diem, including steward's fees, and excellent Norwegian ale and Geneva *ad lib.* Breakfast of fish and meat at eight to ten A.M.; dinner of ditto and coffee at two to four P.M.; and supper, a repetition of the two, at eight to nine P.M. Port, sherry, and Château Yquem = $1 specie (4s. 6d.); champagne, $2; porter, $0·48; and Norwegian beer, 12sk. (3½d.) per bottle. The cooking was excellent, and plate and linen equally spotless; the table was laid *à la Russe* with pleasant little *hors d'œuvres* of sardines and smoked salmon, salt meat, ham, and sausage, in fact what Italians facetiously call "Porcheria." We mentally re-echo Mr Thackeray's hope that Great Britain, who is supposed to rule the waves, will some day devote a little more attention to her *cuisine.*

and assistant steward. The commander, A. W. Müller, is a young lieutenant of the Norwegian navy, which wisely allows its unemployed officers to take charge of postal and passenger steamers. We find the advantage of this arrangement in every part of the establishment. The brasses are bright; the decks are washed; the "squeejee" is used; the offices are clean, and even the spittoons are garnished with fresh heather; whilst the natty little steward and the white-clad cook are pleasing contrasts with the state of affairs on board English craft of the same kind. And we were all charmed with Captain Müller, whose *bonhomie* and obliging disposition made every passenger right sorry to part with him.

June 28.

Steamed out at seven A.M. under Italian skies, and over seas smooth as mirrors, which promised ample enjoyment of this day's "lion," Snæfellsjökull, capping the northern land-arm of broad Faxa Fjörð. As we crossed the Hvalfjörð-mouth, the lay of the land suggested a mighty leaf; the water-line being the mid-rib, with Esja and Akranes representing the up-turned sides. On the south-western slopes of Skarðsheiði, we were shown the streamlet and farm of Leirá, "Rivière de la Vase," which once owned the printing-press; and beyond the broad Borgarfjörð (burg firth)[1] lay the low alluvial flat Mýra Sýsla. The unromantic name, "mire county," becomes ridiculous when Mýra-maður (mud-man) is applied to the dweller: the comical wrath which it excites reminded me of Varnhagen's indignation about the Corcovado or Hunch-back mountain of Rio de Janeiro. Far over the fen-tract, streaked by its three main streams, appeared a suggestive prospect: the long perspective of Jökulls; Ok (the yoke), Geitland's and the northern Skjaldbreið, not to be confounded with the "Broad Shield" on the road to Hekla: this chaos of

[1] Borg, a castle, a city, or a small dome-shaped height, is a common local term. "It may be questioned whether these names (Borgarholt, Eld-borg, etc.) are derived simply from the hill on which they stand (berg, bjarg), or whether such hills took their names from old fortifications built upon them: the latter is more likely, but no information is on record, and at present 'borg' only conveys the notion of a hill" (Cleasby). In Chap. I., I have shown that "borg" and "broch" are sons of the same family.

ice-deserts and volcanoes was ranged in long dorsa, dish-covers, or antediluvian Twelfth-cakes, flattened at the summit, backed by pearly mists of their own growing, with crests rose-tinged by the sun, and feet streaked with transparent blue shadows. In vain we strained our eyes to catch a sight of Baula, the cow, pronounced somewhat like (the land of) "Beulah;" its pale-grey trachytic columns, though 3000 to 3500 feet high, were hidden by intervening buttresses: even Eld-borg, the "Tower of Fire," though quite near the coast, refused to show its grand circular crater and flanks too steep for snow. Here begins the northern Skarðsheiði, which, passing through the Hnappadals (button-dale) Sýsla, anastomoses with the broken cones called Katlar (the caldrons), and with the great Snæfellsjökull, the Snebels Hokell of Pontanus, and the "Western Jökull "of our maps. The long thin tongue of land, mostly trachytic, has been mightily exercised by the fire below. Here, upon a naked Tenerife, rises a tall grey cone, fronted by a little extinct volcano, flushing angry red; there a wall of brown lava is built upon a base of ruddy cinders and scoriæ, which have assumed the natural angle. It is a land of chimneys and spiracles rising from cinders and other *rejectamenta;* of Öl-keldr or "ale" (mineral) "waters;" of cascades, silver fibres dashing into kieves of snow; of jagged sugar-loaves and saddle-backs; of craters either whole or half torn away; and of Klettar or precipices stripped of the snows which encompass them.

Our attention was directed to the Búða-klettar, or cliffs of Buðir, the celebrated centre of eruption which sent forth the Búðarhraun; and at their base, ending the Jökullháls, the long ochraceous slope that falls from the eastern ridge-flank of Snæfell to the settlement of Búðir (the booths), far-famed for chalybeate springs. Huts for invalids have been run up at this well-known "Kur-ort," but the accommodation is described as rough in the extreme. A little westward again, showing its basaltic pillars, lies "Stapi," the steeple-formed rock, a local Staffa, suggesting memories of Fin M'Coul.

All eyes now fix themselves upon Snæfellsjökull: as the break of the sea upon the shore told us, it rises within three miles, and the accidents of weather, though apparently determined to conceal the calotte of snow, combine to form an admir-

R. F. B. *delt.*

SNÆFELLSJÖKULL FROM THE SOUTH.

able setting for the imposing scene. The clearness of the heavens had gradually changed to light mists, which hung mid-way upon the hill-sides: whilst "mackerel's-back" flecks the upper air, wool-pack, growing from the snow wreaths, forms dark-grey columns, perfectly simulating a burning coast, and puffy white cumuli cast a shadow distinct as if drawn by a painter's hand. About one P.M. the northern breeze becomes a south-easter, bringing with it a decided freshness and a few drops of rain. The brown and dun coloured cirri, before floating high above the wool-pack, now girth its middle, and there is a grand contrast between the here and the there. Around us a few cats'-paws fan the waters, which, under the lee of the land, stretch smooth as oil, and the air is mild and kindly. In the upper regions rages and roars "Satan's weather;" the cloud chariots rush forward in solid line against the wind, dashing and clashing as they course and career over the battlefield of virgin snow; they are torn to pieces by the artillery of the Storm-Fiend; the troops whirl away in headlong flight, veiling now one cusp of the crater, then another. The westerly peak is connected by a deeply-gashed synclinal slope, a kind of broken saddle-back, with the eastern horn, or rather horns, which appear in the shape of a "Thríhyrningr," while below them, on the oriental outline, a star of jetty basalt shines radiant in the dazzling white. Below the western peak also the binoculars show a broken quoin, a long, black dyke, and a multitude of dark dots protruding from the *névé*, as if men were ascending. The apex has never been reached, and we at once see the reason why: it is—

> "Like a jagged shell's lips, harsh, untunable;
> Blown in upon by devils' wrangling breath."

M. Gaimard declares the eastern pinnacle to be "*frisée comme des têtes de choux-fleurs:*" it appeared to me umbrella-shaped, with under ribbings of frozen snow. M. Jules Verne was not so happy as usual in making "Sneffles" an entrance for Arne "Saknussemm;" nor could we learn anything about "Scortaris."

The southern front below the *névé* is a steep incline of contorted lava; and a multitude of "hornitos" and parasitic craters, apparently fallen in or choked up, run down almost to the

water's edge, where they form a wall of contorted and caverned layers. Above the cliff a gentler slope has a faint tinge of rainbow-green; and the steeper acclivities are bare, red and yellow, brown and black. As we hugged the shore, I carefully looked for the snow-drainage, and saw none: had there been any, the sea-scaur must have shown it. Henderson rightly reports the general belief that the water set free by the sun passes by underground tunnels to the sea; and, all along this peninsula, the people hold to subterranean connections. But the explanation somewhat savours of the Congo Yellala (rapids), where the mighty mass of the upper stream, "above the ghauts," is supposed to pass through an invisible channel. Herðubreið afterwards taught me that Palagonite allows no surface drainage in the dry season; and this I hold to be the true explanation of a remarkable phenomenon often seen in Iceland.

So striking a feature as Snæfell, whose shadow may be traced in the air, could not fail to engender a variety of tales and legends. Some declare, with the old Sagas, that it is within sight of Hvítserk in Eastern Greenland. Certes its height (4577 Danish feet) is very far from affording a vision ranging over 200 direct geographical miles; but here we are little more than a degree from the Arctic circle, and it is hard to limit the magic powers of refraction.[1] When the bishop declared that it was unassailable by reason of "Dominus Bardus Snæfellsás, cujus sine auspiciis mons Snæfell vix, ac ne vix quidem, superari potest," he alluded to a superstition still preserved. In Hitárdalr,[2] farther east, is shown a huge feminine face carved in stone, and said to represent Hit, the Ás or guardian goddess of the dale: a "Plutonic affection" exists between her and Bárð or Snæfell's Ás, whom Mackenzie calls a tutelar saint, and whom Charles Forbes uncivilly converts from Dominus to demon. He represents right well the Spirit of the Glacier. Curious to say, the same tale concerning the "Loves of the Mountains" is told in far New Zealand, where

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[1] Captain Graah (loc. cit.) looks upon this as a mere fable: I do not.

[2] Hít is a scrip made of skin, and, metaphorically, a big belly. With a short vowel, Hitár-dalr means the Vale of the Hot (*i.e.*, volcanic) River, opposed to Kaldá or Cold Stream. According to Cleasby, the derivation from the Giantess Hít is a modern fiction not older than the Bárðar Saga: he also, contrary to other authorities, makes Dominus Bárð a giantess.

Messrs Tongariro and Taranaki (Mount Egmont) are jealous as they are amorous of Mrs or Miss Taupo.

The earliest climbers seem to have attempted the ascent from the east and south-east, where the snow-line extends much lower. Such were Eggert Ólafsson (1755); Mr, afterwards Sir, John Stanley (1789); and the three Britishers who "wrote their mistresses' names in the snow—the emblem of their purity." Sir George Mackenzie (1810) remained below, and Drs Bright and Holland went stoutly up: the latter tells us (p. 55, Recollections of a Fast Life) that a snow bridge gave way during the descent, and one leg sank through the arch: he was saved by the poles of the two Iceland guides, but ever after he sought to shun the remembrance. They were followed by Henderson (1814), by Gaimard (1835), and by Forbes (1859).

Of course, none reached the very summit. The Frenchman sensibly attempted it from the north, and found the slope easy: we shall presently see his line of march. Remains only to try the west where the snow lies much higher up, and where the angle does not apparently exceed 25°: here also the distance to the cusps or peaks is notably shorter. The Beruvík farm appears to be a good starting-place. But Alpines who love "climbing for climb" must remember that without ropes and ladders, perhaps kites also, and very likely with them, it will be impossible to do more than has been done by their predecessors.

The accidents of the shore-line preserve their interest: the lone rock Göltr (the deer)[1] and the twin Lón-drángar (sea-inlet drongs), donjons of lava 240 feet tall, the north-western appearing as if standing inland, where a red rock acts castle. Beyond it, amongst the conical and degraded craters, we remark the Tröllakyrkja, Kirk of the Trolls, or Giants, who here have a diocesan as well as a governor. They have been busy on and off this coast, as shown by the Tröllа-botn, Giant Bay, the Polar Sea between Norway and Greenland; the Tröllа-börn (chimneys), or volcanic "hornitos;" the Tröllа-hlað, the Giant's Causeway, or colonnade of basalt; and the Tröllа-dyngjur, or Giantesses' bowers,

[1] The Dictionary gives Göltr, a hog, and Kolla, a deer without horns, a humble deer, a hind.

the mamelons near Reykjanes, which erupted in A.D. 1000. And that the dwarfs have not been idle we see by the Dverga Kamarr, their hollowed chambers in the basalt. We run by Dritvík (guano bay), along the caverned cliff, built in various layers, here frosted like silver, there dotted with white points, which prove to be birds. At Öndverðarnes (fronting naze), after an hour of thorough enjoyment, thanks to Dominus Barðr, we turn the corner, the north-westernmost projection of Snæfellsjökull, which the pilot calls Svarta-lot, from the steps protruded by the swart sea-wall; we open the Breiði Fjörð, and again we find waters smooth as a silver plate.

Not that Broad Firth is always so well behaved: at times he rages with frantic violence, mixing sea and sky till the general view is like a well-shaken basin of soup, and confusing all the elements in a chaotic matter, which justifies the much-maligned Pytheas. Many have been drowned when crossing the dangerous sea, amongst them Ólafsson, the Icelandic traveller, in 1767; shortly after he had "addicted himself to the study of revealed religion." During the winter of 1873-74, it was completely invested by the Greenland ice; congelation extended as far as the eye could reach from the highest hill-tops; and drifted bears were slaughtered by the peasantry. There are traditions of skating across the broad bay, of seals being killed, and of ships' anchors being blown away by the furious wind. At least, so says Mr Clausen, who has now taken us in charge. The grandson of a Danish merchant mentioned by Henderson, he has married a wife from Bonnie Dundee, and he has spent some four years at Melbourne, which have opened his eyes to auriferous quartz-reefs, to large deposits of iron, and to other minerals in his native island.

We delay for a while at the mouth of the big bay to swing the ship and prove her compasses, a precaution never to be neglected. The "Jón" then runs at a respectful distance along the northern shore of the Snæfellsjökull tongue, which is not less interesting than its southern coast. Our cicerone points out Enni or Ennisfjall, "forehead mountain," *la montagne de front*,[1]

[1] Both translations are somewhat too literal: Enni, a forehead, secondarily means the "*brow* of a hill," a steep crag, a fronting precipice.

where those who would avoid a long detour inland must pass over an Úfæra or "don't travel" path—sands liable to frequent bombardments from the red bluff 2500 feet high. Henderson tells the exaggerated tale of its horrors, quaintly wondering how they were not felt by the young girls who rode with him. Mr Clausen then introduces to us Ólafsvík, his ancestral home, two slate-roofed houses, with surrounding huts, nestling in a sheltered bay; and, by way of urging his hospitality, he nobly makes us "free of the cellar."

SUKKERTOPPR AND LIKKISTA (SUGAR-LOAF AND COFFIN).

The eastern point of the "Vík" is Búlandshöfði (farm-land head), of whose road Forbes has given a sketch, which verily makes the reader "squirm." From the sea, it appears a cone some 2000 feet high, shelving towards the water, composed of many couches, said to belong to old basaltic formations, rich in zeolites: between them are ledges and *débris* of the columnar type. All own the road to be dangerous for the side-saddle; but also Mr Clausen had travelled over it in winter, cutting steps for his nags in the icy snow, and holding on to his pony's tail.

An adjoining headland to the east showed us the quaint features called the Coffin (Líkkista, the lich or corpse kist) and Sukkertoppr (the sugar-loaf), both rising from a transparent sea, and backed by slate-coloured walls and snow-dotted peaks. The former is an elongated dorsum, with a shallow dome above, steps around its neck, and lower slopes of a brownish-red. The Pão de Assucar, thinly greened, and laterally barred with grey rock, seen from the north-east, is a regular cone, like the Sugar-loaf of Sutherland; and over all hangs, like a halo, the glorious presence of Bárðr's home, whose snow roof stretches far lower than on the southern side. As the sun slants towards the west about 10.30 P.M., his last fires light it like a noble opal in a shining bezel of sleety blue, the glow waxing brighter and brighter till the snow, all aflame, dims every other object of earth, sea, and sky. At last the fire burns slowly out, a tall white spectre, the ghost of the morning's scene, towers in the upper air, and the world becomes once more cold, dull, and pale —by contrast colder, duller, and paler than ever. It had been a "thing of beauty," even though the incomparable scenery of Magellan's Straits, rendering me not a little fastidious, was still fresh within my brain.

As we steam eastward we are shown the red Hraun of the Berserkir,[1] two light-coloured knobs thrown out by the red and broken forms of the Drápuhlíðarfjall. It has been asserted that Dr Backmann dug into the Bersekja-dis, and found two skeletons, but men on the spot know nothing about these *fouilles*. The story of their acting Macadam is too well known to repeat, since

[1] As the "Berserkir" is becoming a power in novelistic literature, it may be advisable to give the correct form. The singular nominative is Ber-serkr, the plural Ber-serkir, and the oblique form Berserkja, *e.g.*, Berserkja-dis, cairn of the Berserkir. Cleasby (sub voce) shows that the common derivation, taken from Snorri, "berr" (bare) and "Serkr" (sark or shirt) is inadmissible, and greatly prefers "Berr" (a bear), whose skins were worn by athletes and champions; perhaps also here we find traces of that physical metamorphosis in which all the older world believed. The "Berserksgangr" (*furor bersercicus seu athleticus*), when these "champions" howled like wild beasts, gnawed their iron shields, and were proof against fire and steel, may be compared with the "running amok" of the Malays, and the "bhanging up" of the Hindu hero—invariably the effect of stimulants. This fact considerably abates our interest in Eastern tales of "derring-do," for instance, in the account of the two sentinels at Delhi, whose calm gallantry, probably produced by opium or hemp, is noticed in pitying terms by Sir Hope Grant.

it appeared in the Eyrbyggia Saga; we may observe, however, that it has every characteristic of the normal Icelandic legend. There is the unavoidable woman in the case, Asdisa, "a young, haughty, fiery, and robust damsel." The chief actors in the tragedy, Halli, Leiknir, and their destroyer Arngrim, surnamed Víga Styr (the stirrer or restless one), are all poets; and the latter characteristically boasts of a foul and cowardly assassination, as if it were a deed worthy of a Bayard. The highly honourable nature of murder pure and simple, unaccompanied by aught of risk or gallantry, belongs to a certain stage of society, and the Eastern reader finds many instances in the career of Arab, Persian, and Hindu heroes.

And now, in the cold, fierce wind, we run past a scatter of islets, especially noting Elliðaey (Ellwich Isle), the private property of the bishop, whose fair daughter is on board. The light-green surface, effect of summer growth, supports a few wrack-eating sheep; and the dark masses of subcolumnar basalt, bluff to the north, and pierced with black caves, are silvered over by troops of birds. About eleven P.M. we turn sharp to starboard, and sight our destination, Stykkishólm, not Stockholm, not *arène de morceaux*, but "holm of sticks," that is, bits of pillared stone: the settlement's name is taken from one of the three rock-islets to the north, Stykkisey. Leaving tall Súgandisey (wind-gush isle) to the east, and the larger Landey to the west, we presently find ourselves in a well-defended, dock-like inlet, with a landing-place above high tide. The comptoir was of more importance than usual, Stykkishólm being then the capital of the Western Quadrant: a schooner, two brigantines, and a smack lay at anchor; seven flags were flying; of the eight houses two were double-storied, and the parsonage boasted of a white belvedere. Crosses on the rock-dyke, one looking from afar like the ancient Irish, suggested a non-existing Calvary. The oldest tenement was that occupied by the Amtmaðr, or high sheriff.

My first care at Stykkishólm was to see the Hr Administrator A. O. Thorlacius, agent of the steamer: he came on board with his son, but, unfortunately, we were "barbarians to one another." The father has taken meteorological observations once per diem, at noon, since November 1845: in 1866 he was provided with

instruments by the Board of Trade, and his labours have appeared in the journal of the Scottish Meteorological Society.[1]

Early next morning we set out, mounted on rat-ponies, and guided by Mr Sýslumaðr Skúli Magnússon, to see the curiosities of Thórsnes, the little peninsula which was once a hot-bed of heathenism. Some cantonniers were working at the path, which combined the Brazilian pleasures of slippery plank-bridges, foul causeways, and corduroys of slush; we were compelled to round the long inlet Vésvágr or Vé-vágr (holy bay), because it cannot afford a ferry: here broken bottles showed a habit of picnicing. Turning to the south-east we sighted Helgafell (holy hill), a common name, as we have seen about Reykjavik. This lump of subcolumnar basalt, perpendicular to the north and east, and falling with an easy grassy slope to the south-west, after being honoured as hillock never yet was, was chosen for one of the earliest Christian churches; and people still pray at the dwarf chapel on the "Mount of Immortality," because the habit is 800 years old. It still preserves intact the memory of Snorri Goði (the priest of Thor), "who was good to his friends and grim to his foes:" the Eyrbyggia Saga tells the tale of his intrigues, cruelties, and murders, Arnkell, whose tumulus is hereabouts, being the "Charles" or good boy of the story. We were shown the Munkrskarðr, where the holy men bade farewell to their beloved monastery, a kind of Arctic "Last Sigh of the Moor"—an illiberal English sacerdos adds, "their heart, doubtless, was with their treasure, buried in a hill-side." Monks, you see, are not like other men; they must always be either almost superhuman, or, that failing, subhuman.

Thence we turned to the east, where Thórsnes lies, and whence the old Thunderer looked out upon Hofsvágr or Temple Bay.[2] Here, in A.D. 883, Thórolfr Mostrarskegg (of the big beard), following the pillars of his high seat round the head of Snæfellsjökull, took possession of the ground with burning firebrand, as was the significant custom of the day. The good guide, being utterly guiltless of all local knowledge, led us up to a substantial farm-house, at whose door stood a blear-eyed old franklin. Our

[1] For the observations at Stykkishólm, see Introduction, Sect. II.
[2] Henderson (ii. 67) places "Hofstad" on the western side of the peninsula.

nags, which attempted to crop a few blades of grass, were incontinently seized and tethered to a long cord—after the open-handed hospitality of the Syrian peasant, who, however poor, supplies your animal with barley and bruised straw, I was struck by the change for the worse. Usually the people are to be pitied; they would, perhaps, be hospitable, but they cannot afford it where every ounce of fodder is wanted. Even in the wealthier age of paganism the guest who outstayed his three days was said to "sit," and was held to be a cosherer or vagrant. This "bonder," who had 200 head of sheep in his "rétt,"[1] and 300 elsewhere, evidently had better use for his grass than the pauper. Moreover, there is far more ceremony in hyperborean than in sub-tropical lands. If the farmer be absent, an Icelander will not enter the house; the women know nothing, and prefer running away from strangers. When the master is at home, the guest is too shy to ask for what he wants. After a sufficient experience, I ended by dismounting, walking up to the door, offering a pinch of snuff and a drain from my brandy-flask, and roundly explaining my general requirements, to be paid for, *bien entendu*. A stranger may do this, but the natives have a punctilious regard for one another's feelings, an admirable but uncomfortable quality, which prevents their taking or tolerating any such liberties.

The steamer was to start at ten A.M., and the garrulous old man was determined to extract every item of European news from the guide, whilst Mister Sýslumaður could not disappoint a constituent—the average dawdling is worse in Iceland than in Peru. At length he sent with us his son, and this nice-looking lad led us to a shore fanged with hideous stumps of basalt, grey rocks wetted by the perpetual wave, and long muds foul with wrack, which resembled cods' sounds. It had a certain weirdness of aspect, especially its background, the torn and tormented flanks of Drápuhlíð,[2] an extinct volcano to the south, famed for

[1] Réttir are the big public pens, Dilkar the small folds round the former, and the Stekkjarvegr is the spring-fold; all are dry stone walls, as on the Libanus.

[2] As the word is written, it can only signify "Lithe (slope) of the panegyric;" Drápa being a poem in honour of gods, saints, kings, princes, and so forth, as opposed to the short panegyric "Plockr," and to the longer "Hroðr," or "Lof." The boatman, however, explained it to mean Slope of Death, *i.e.*, where some battle took place, and this would be derived from Dráp, slaughter. Both words (says Cleasby) come from Drepa, to strike. There is also a dispute concerning the formation of certain beds in this mountain, some holding that they issued

minerals and alternate strata of trap and ropy lava. The only remains of the Virki ("work"), where the local Thing met, were vallum-like lines of green sod; and the Dóm-hringr, doom's ring or judgment circle, was a triangular shape, with the base facing the shore. Not a sign of the Hof was to be seen; the Blót-steinn, or sacrificial stone, was asked for, but beyond legends of buried treasure, nothing was known to the incurious peasants.

On our return to Stykkishólm, we called upon the Amtmaðr (high sheriff), Hr Bergr Thorberg, who, fortunately for us, spoke good French. He assured me that Hr Skuli Magnússon had found the Blótsteinn, and we again accompanied him to sketch it. After thirty minutes, a boat placed us on the eastern side of the little peninsula, and we landed upon the broken basalt, weedy and slippery as ice. This shore is still known as Thórsnes, and the place as Thingvellir. After vainly seeking information at a cottage, inscribed T. (Teitur) G. S. Guðmunds-son, 1869, we found a shepherd lad, who steered us through the swamps to a rise on the west, a site marked by a Varða of rock. The "Stone of Fear" was a bit of basalt, six feet long by six feet two inches broad, and half buried in the ground: at least, such was the article shown to us. South of it lay the Doom-ring, a circle of rough rocks, twenty-five feet in diameter. Between the two were buried the criminals whose backs had been broken upon the stone.[1]

In these forensic and sacrificial circles the judge, still called "Deemster" in the Isle of Man, faced eastwards, with his back to Holy Hill, at which man might not look without ablution. On his right, the direction of Múspellheim, the place of honour, from the profound popular reverence for the sun, stood the

from the same crater successively, and others, simultaneously, from different mouths.

[1] Henderson (ii. 68) places the stone in the swamp, not on the hill-side; Forbes (219) adds that it was in the centre of the Doom-ring. If so, we did not see it: moreover, Mr R. M. Smith heard from Hr Thorlacius that we were misled. I cannot help believing in the shepherd-boy; and there was no mistaking the Doom-ring. For the most part, the instruments of death stood in the fens where certain classes of criminals were drowned. On the other hand, the Landnámabók (chap. xii.) says, that after the profanation of Helgafell (Monticulus Sacer), Thórðr Gellir "forum (Thing) in *superiora linguloe loca* ubi nunc est, transportavere . . . ibique adhuc conspiciendus est lapis Thorinus (Thórsteinn), supra quem homines sacrificio destinati, frangebantur; ibi etiam circulus judicialis existit in quo homines ad victimas condemnabant."

accuser. The accused was on his left, in the line of Niflheim, the nebulous north, a scene of horror and guilt, which the old Germans called midnight. The twelve doomsmen occupied the space within the Dóm-Steinar, where benches, here probably of turf, were provided for them. The sentences delivered from the "Circle of Brumo" were almost poetical in their ferocity. The old pagan Scandinavian was the incarnation of destructiveness. His was not the fickle pugnacity of the Kelt, who would fight and shake hands within the hour; nor the feeble pride of the classic, who only battled to "debellare superbos:" he was a Shiva, satisfied with nothing less than absolute annihilation. The blood-men were warned lest "weak pity step in between crime and its fitting punishment." The following was the form of outlawry sentence: "For this we judge and doom thee, and take thee out of all rights, and place thee in all wrongs; and we pronounce thy lawful wife a lawful widow, and thy children lawful orphans; and we award thy fiefs to the lord from whom they came, thy patrimony and acquired property to thy children, and thy body and flesh to the beasts of the forest, the birds of the air, the fish in the water. We give thee over to all men upon all ways; and where every man has peace and safe-conduct, thou shalt have none; and we turn thee forth upon the four ways of the world, and no man shall sin against thee."

And this doom was to extend "wherever Christian men go to church and heathen men sacrifice in their temples; wherever fire burns and earth greens; wherever mother bears child, and child cries for mother; ship floats, shield glitters, sun melts snow, fir grows, hawk flies the long spring day and the wind stands under his wings; wherever the heavens vault themselves, the earth is cultivated, the gale storms, water seeks sea, and men sow corn. Here shall the offender be refused the Church and God's house, and good men shall deny him any home but hell."[1]

[1] Compare this Northern effort with the poetical Greek curse at the Akropolis of Athens: "I entrust the guardianship of this temple to the infernal gods, to Pluto, and to Ceres, and to Proserpine, and to all the Furies, and to all the gods below. If any one shall deface this temple, or mutilate it, or remove anything from it, either of himself, or by means of another, to him may not the land be passable, nor the sea navigable, but may he be utterly uprooted! May he experi-

And the old Scandinavian punishments were sanguinary and atrocious as those of the Thulitæ, of whom Procopius spoke. Criminals were cast to wild beasts, burned and boiled alive, flayed and impaled, to say nothing of mutilation and such a trifle as tarring and feathering.[1] Cowards were drowned or smothered in mud. Forest burners were exposed to the fire till their soles were roasted. Barkers of trees had their internals nailed to the injured bole, and were driven round it till their bowels took the place of the despoiled coat. Removers of boundary-stones were buried to the neck and ploughed to death with a new plough, drawn by four unbroken horses, and driven by a carle who had never before turned a furrow. And so forth.

The aspect of the Dóm-hringr vividly reminded me of the old theory held by Sir Walter Scott, to mention no others, that Stonehenge and similar buildings were Scandinavian courts of judicature, in which criminals were doomed and put to death. One of these fora was fitly described by Olaus Wormius as "Undique cautibus septum"—hemmed in on all sides with stones equal to rocks, and usually disposed at a bowshot from the centre. So Camden says of Stonehenge it is a "huge and monstrous piece of work such as Cicero termeth 'insanam substructionem:'" his sketches make it like a dance of giants (choir gaur or chorus magnus), justifying Walter Charleton's "Chorea Gigantum, vulgarly called Stone-heng" (London, 1663), which he also restored to the Danes. Mr Fergusson's anti-Druidical protest was anticipated as far back as 1805 in the "History of the Orkney Islands" (Longmans, London), by the Rev. George Barry, D.D., who justly observes, "These extraordinary monuments have, like almost all others of the same nature, been supposed Druidical; but with very little reason, since there is not the least shadow of evidence that that order of men was ever within these islands;" while Coxe justly calls the Druids

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ence all evils, fever, and ague, and quartan, and leprosy! And as many ills as man is liable to, may they befall that man who dares to move anything from this temple!" Perhaps the most picturesque composition of the kind is the inscription upon the sarcophagus of Eshmunazar, king of Sidon—at least in the translation of the late Duc de Luynes.

[1] This form of "lynching" is popularly and erroneously supposed to have been invented upon the Atlantic seaboard of the United States. The Brazilian "Indians" practised it by way of ceremonial toilette.

a "favourite order of men, under whom we are apt to shelter our ignorance." Stonehenge and its chiselled, tenoned, and morticed trilithons and cronets, though finished with more art, are evidently the same class of building as the Standing Stones of Stennis; and both would appear to represent in comparatively genial climes and populous regions the rude Doom-ring of Iceland. I need hardly notice the opinion of the Rev. Isaac Taylor, who, in a wild and ignorant book (p. 43, Etruscan Researches; London, Macmillan, 1874), converts to Turanian sepulchres the monuments which covered the Wiltshire downs, and who considers the stone circle a survival of the weights which kept down the skin tents. Though bones have been found within such buildings, and without the rings, the sepulchral use may have been of later date.[1]

Part II.—To Grafarós.

Our next station was at Flatey, on the other side of the Breiði Fjörð, one of a vast archipelago which we were slowly to thread. Like the "cedars of Lebanon," three things in Iceland cannot be counted—the lakes, or rather ponds, of Arnavatnsheiði; the

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[1] Waring and many others suggest that the "Prostrate Stone" lying north-east of the horse-shoe or elliptical opening of the Stonehenge trilithons, and the three—formerly five—fallen stones inside the vallum, represent the first or outer circle, like that of Avebury. It is usually assumed that the "Friar's Heel," the single block lying farther to the north-east of the "Prostrate Stone," served for astronomical purposes, the sun rising over it on the summer solstice, and striking the sacrificial Thorsteinn or Blótsteinn (4 by 16 feet). The same arrangement is remarked at Stennis. There seems, however, no reason why both should not have been members of an outermost circle.

Martin (Description of Western Islands, London, 1716) has preserved the popular tradition that the sun was worshipped in the larger, and the moon in the lesser, ring of the Orkney ruins. Later writers deny the honour of erecting the circles of Stennis and Borgar (anciently Broisgar = Brúar-garðr) to the "Northmen," because such circles are found only in localities where a Keltic race has ruled, and because "such names as Stennis and Stonehenge prove that they had existence before the people who so designated them arrived in the country." The *causa* appears to me a *non causa*, especially if they were Thingsteads and Doom-rings, which in later days would take modern and trivial names from their sites or peculiarities of structure. On the other hand, the absence of tradition concerning the popular use of the buildings, which we might expect to linger in the minds of men, is a serious objection.

hillocks of Vatndalshólar, and the islands of the Breiði Fjörð. Similarly it is said no Laplander has lived long enough to visit all the islands in Lake Enara, and no Swede has touched at the fourteen hundred of the Malar Lake. The holms lie mostly at the bottom and on both sides of the Broad Firth, and, being girt by broad reefs, they demand no little prudence. Some are private property, but the greatest part belongs to the parsonage of Helgafell, whose incumbent lives at Stykkishólm. These quaint forms, the birth of upheaval and the toys of earthquakes, all show traces of columnar and subcolumnar basalt: the colour is chiefly black, whitened by gulls and sea-fowl; some are dimly green with a house-leek bearing a pale flower; and here and there a Húshólmr supports a homestead. We remark the "wash" dry at ebb-tide; the shoal, the dot, the knob, the drong, the "cow and calf," the dome, the pinnacle, the "gizzard," like the Moela of Brazilian Santos: the nub, the skerry, the shield, the line, the ridge, and the back: castellations are common, and one at the mouth of the Hvammsfjörð (comb-firth) bears two dwarf cones passably resembling broken turrets.

Our signals failed to attract the pilot, who lives at Bjarneyjar, and thus we were forced to rely upon ourselves: the grey weather and spitting rain were, however, far less risky than sleet and snow. To starboard lay the Dala Sýsla, a fat lingula of land, bounded south by the Hvammsfjörð, and north by the Gilsfjörð. In the latter direction a neck of about five miles broken by a lake, leads to the Húnaflói (bear-cub floe),[1] opening upon the Polar Sea, and a canal like that of Corinth would save rounding the great three-fingered palmation, the work of west winds[2] and Greenland ice, which forms the north-west of Iceland. Once upon a time a Troll, we are told, attempted to anticipate the *specialité* of M. de Lesseps, but he was caught by the sun before his task was done, and, after the fashion of those days, he was incontinently turned to stone: so travellers are still obliged to

[1] We have retained the word "Flói" in ice-*floe*. It properly means the deep water of a bay opposed to the shallow water along shore.

[2] We see in Ireland, Scotland, and the English coast about Bristol, the effect of these gales: they prevail along the coast of Brittany, become less violent in the Bay of Biscay and along Portugal, and finally the Mediterranean, as the regular outlines of the Balearics, Sicily, and Malta prove, ignores them.

ride across the neck. Hvammfjörð (comb-firth) is a fair specimen, says Munch, of how trivially local names arose; the Landnámabók (ii. 16) tells us that here (Kambsnes) Aud Ketilsdottir *pectinem suam amisit.* But Hvammr also means Convallis, a place where several dales meet, or simply our "combe." The Dale-County peninsula ends westward in the Fellströnd highlands, whose chief height is called Klofi or Klofningr (the cloven), because it separates the two inlets; from the north its profile, projecting the lowlands of Dægverðarnes (daywards naze) reminded me of bottle-nosed Serafend (Sarepta) as seen from the Sidon road. Off this headland we sighted a couple of small whales: in the early part of the century we read of a school numbering some 1600, but now-a-days the long-fibred Medusæ seem to be a waste of cetaceous provaunt.

At length the south-easter brought up heavy rain, veiling the shore, and compelled us to turn for occupation to the study of our fellow-passengers. At Stykkishólm we had shipped a Dr Hjörtr Jónsson, an Icelander who spoke a little Latin and English, and who was very civil and sea-sick. He had studied under Dr Hjaltalín at Reykjavik, and had finished himself by a year at Copenhagen. The feminine part of the "old lot" has at once thrown off the civilised hat and adopted the ridiculous Húfa: the black or the grey shawl is sometimes worn over the head with something of the grace that belongs to the ornamental *mantilla* and the useful *reboso.* All are in leathern *bottines* which show the toes carefully turned in when walking or sitting. First-class and second-class of the ruder sex are distinguished by boots and "Iceland shoes:" so the railway clerk in the Argentine Republic ranks you by your spurs, the larger they are the lower you go. We distinguish the Danish-speaking by a perpetual recurrence of "Hvává"—hvad behager, s'il vous plaît? —from the Icelandic-speaking by an ejaculated "Há," explosive, aspirate, and nasal enough for Vikings and Berserkir. There are half-a-dozen students with bowie-knives and long canes, like officers of the United States navy. The signs of Burschdom are noise, inquisitiveness, republicanism, hard drinking, and consequent "hot coppers," especially in those who are "unco heavy on the pipe." They gather together, singing Luther's hymns and

national Norwegian airs, whilst not unfrequently they intone in chorus—

> "Doolce reedentem Lalagen" (pronounce *Lala-ghen*) "amábo
> Doolce loquentem."

They gather round us, forgetting the venerable axiom, "Manners makyth man;" they pester us, and ask in roaring voices about the English "hestar," for they naturally hold us to be horse-dealers, and, as the universal bow-legs show, all are "horsey" from babyhood. Their luggage consists mainly of old saddles and bridles, and of nests of sealskin riding-bags. They talk politics, they regret the old Iceland republic, and they hope to see it once more—this must be expected from students, and we find it even in the law-abiding Brazil. Two of them are never sober, and huge horns of spirits acting bottles supply the *de quoi:* all drink hard at each landing-place, which leads to the "stool of repentance" next morning. Their heartiness, not to say their roughness, is dashed with a curious ceremoniousness: they never omit pulling off their hats, an uncomfortable practice perhaps less common in England than elsewhere; they shake hands whose warts cause a shudder; and, when they exchange the parting kiss, it is with deliberation—first prospecting the place, then planting a "rouser" upon each cheek, and finishing off full upon the mouth.

The Coryphæus of the band is a little rather reverend, freshly ordained and stationed at some hole in the Skagafjörð, which elicits not a few mild witticisms connecting his domicile with purgatory. Sir Guttormr, who violently objects to his name being translated "*Dei vermiculus,*" makes the serious mistake of disputing on Old Testament subjects with Mr Levi, a Norwegian Jew, whom I had at once diagnosticised and drawn out by a "Shalom lach:" Apella is now going to try the north, last year he and his partner "did" the south. Their business consisted in women's hair, especially the tints which command such large prices in the southern marriage-marts; and, unless report greatly belie them, they collected their booty by "screwing" husbands and brothers up to the cutting point with spirits.

Two hours' steaming through the maze of rocks placed us at Flatey. It occupies nearly the centre of the Eyja-Hrepp (island

parish), and it is connected in trade with the Svefneyjar or Isles of Sleep—ah! how different from

"That happier island in the watery waste"

which lodged the lotus-eaters. Flat-isle is, of course, not flat, but rolling ground, trending east-north-east to west-south-west, with a dwarf bluff in the former, and a high basaltic rib in the latter direction. The length is at least a mile, by about three-quarters of utmost breadth, though Henderson (ii. 91) gives it only one mile in circumference. Curious to say, the little rock has a name in literature, through the "Codex Flateyensis," or annals of the Norwegian kings.[1] In A.D. 1183 its monastery was transferred to Helgafell, and, during the Reformation, its ninety-six farms were duly secularised and annexed by the Danish Crown. At present about a quarter of the island belongs to the Church; and thus the clergyman is no longer obliged, like Sira Andreas, to "follow the original employment of Zebedee's children," and be "particularly dexterous in catching seals."

We landed on the north-western side of the island, about its middle length, at a regular dock fronted by a natural breakwater of basalt, upon the usual scatter of slippery wrack-grown rocks backed by a few yards of black sand. A rude causeway, not made by man, leads up to the settlement, half-a-dozen houses, one wholly wooden and double-storied; the rest of the normal ground-floor type, overgrown with the white-flowered weed. The huge vats and oil-tuns were not wanting: there was a windmill like that of Reykjavik for grinding imported rye, and higher up stood the church. A wooden box like those of the old Saxons, it had a long coffin for a deceased clock, a steeple of two stages, each with a white-framed window staring out of the black tar: where the apse should be, the outline was stepped after Iberian fashion. The cemetery lay around it, with a few monuments and railings neglected and broken down, and this being Saturday, of course the building was closed. We walked to the

[1] The work of Jón Thórðarson and another compiler in the fourteenth century, who transcribed from old MSS., and bring the history up to A.D. 1395, that is a century before the Columbian discovery. A facsimile specimen of the vellum manuscript used by Professor Rafn as the basis of his text is given in the "Antiquitates Americanæ."

north-east over the wet grass and warty ground, and then turned south-west towards a sloping and time-wrecked cross, crowned with an old billy-cock and a fragmentary stocking. This is not intended for irreverence, but to show that the place is to be respected by hawks, ravens, and strangers; the utilitarian idea comes from Norway, where, indeed, we must go for explanation of many Icelandic peculiarities. The eiders, here and in Stykkishólm, float about the harbour tame as horse-pond geese; at times a Skua causes the duck to bolt with prodigious cackling, followed by its young, piping their plaints. The turf is shaven and hollowed to make the nests, which affect the wrinkles and pock-marks of the surface, and the places are marked by pegs; as at Engey, some show eggs, others ducklings, whilst others are abandoned with the down carelessly left to decay.

We returned on board in a greasy boat, with huge hooks fastened to wooden bars, and baited with flesh of the sharp-biting puffin. The "sea-parrot" nests in the sand, making holes two to three feet deep, and clinging to one another when dragged out. The head and feet, wings and entrails, are often mixed with cow-chips for fuel, whilst the breast is salted. On this occasion, and many others, I remarked that the sailors prefer turning sunways or to the right (*deasil* or *dessil*), the left or "widdershins" being held uncanny. The superstition is rather Aryan than Semitic, the former affecting Pradakhshina, whilst the Tawáf of the latter presents the sinister shoulder. So in the marriage ceremony of the Russian Church, bride and bridegroom thrice circumambulate the temporary altar.

June 30.

During the night we had steamed along the bold bluffs of Barðaströnd in the Sýsla of that name: now we prepare to double the great north-western projection of Iceland, which somewhat resembles south-western Ireland. The country people extend the right hand horizontally: the thumb forms the length, whose nail is Snæfellsjökull; the hollow between pollex and index represents the Breiði Fjörð, and the other fingers are the digitations of the *annexe*, North Cape being the ring of the little finger.

The day broke frosty but kindly, like a fine November in

England, with a sharp north wind, and an oily sea under lee of the land: stationary cirri stood high in air, and westward gleamed a clear stretch of green-blue sky. After Patriksfjörð, another remnant of the Írar or Eriners, and Tálknafjörð (whalebone firth), both of small importance, we open Arnarfjörð (Erne firth), the most important in the north-west after the Ísafjörð. Each greater *massif* is jagged into a saw-blade of minor peninsulas, forming shallow arcs, probably the work of ancient glaciers meeting the Greenland icebergs, and every valley is now bisected by its own drain, set free from the upper snow-fields. There is similarity but no sameness in the wild view. The cliffs give the idea of having been shot up their present height perfect and complete; the table-land, some 2000 feet high, and, of course, snow-covered, appears evenly upraised, yet laterally split in all directions by jagged rifts. Seen in profile, the cliffs form a long perspective of headlands, quoins, and bluffs, ranging between 500 and 1500 feet in height; and the strata appear to be horizontal, or little inclined. The bluffs, when faced, represent trap-ladders alternating with layers of reddish tuff: when distinctly stepped, they often fall steep and sheer to the unfathomed sea; in other places they are footed by a talus of *débris*. The former shape appears most commonly in the southern projections; in the northern tongues the Plutonic spines occupy far less area than the verdant lowlands which depend upon them, and these shallow slopes and plainlets are the sites of homesteads. The bleak table-lands above the bluffs are barely grown with hardy shrubs and gramens; the snow gradually increases as we go northwards; the patches and powdering become long streaks, and at last they touch the water's edge, where every wave besprinkles them. Thule is here fairly Snowland.

All these projections culminate southwards in the great Gláma (clatter) system, and northwards in the Dránga Jökull, these two being the only important masses in the north-western corner of the island. They are said by those who have ascended them [1]

[1] In June 1862 Mr Shepherd and his party succeeded in mastering the Dránga Jökull. Upon the summit the barometer marked 26·5° (at sea-level 29 inches, not degrees), and the thermometer 32° (F.). Glámu (Dict., Glam, Glamr, Glaumr, glamour) is translated "noisy Jökull," from the hljóð (Germ. Laut), or the clamour, the crashing and clashing of ice-slips and torrents.

to be becoming one great glacier, but as yet there are no exact data whereby to calculate either the measure or the periodicity of abnormal glacier action. The Gláma throughout our cruise was capped by clouds, which occasionally burst, and showed the slope and shoulders of the great hunchback.

We then opened the long and winding sea-river known as Dýrafjörð (wild-beast firth),[1] at whose northern bend rose the ridge of Gnúpr (*Cacumen montis*), foreshortened to a regular cone. A few farms were scattered about; and behind Gnúpr lay Mýrar, the northern station of the French frigate. The sea was by no means desert, we saw at the same time a schooner and half-a-dozen luggers, Gauls and Danes, the latter mostly confining themselves to the Arnarfjörð and the Ísafjörð. This must be a good line to attack the western horn of the Gláma, upon which Gunnlaugsson places a trigonometric mark, with farm-houses and "Skóg" (forest) extending eastward to its very base.

The next feature was the Önundarfjörð (Önundr's firth), whose tenants are famed for wearing the longest beards on the island. The Súgandafjörð is distinguished by its deposits of Surtarbrand or lignite, which the people throughout this part of Iceland declare to be found on the headlands, not where we might expect it, in the bays. Fine specimens were sent to England last year (1871), and it is believed that a foreign company will take the semi-mineral in hand.

We were now approaching our third station, and shortly after mid-day we turned "Jón's" head east. Isafjarðardjúp,[2] the deep of the ice-firth, and the largest of the north-western inlets is so called because when first sighted by Flóki it was filled with polar icebergs,[3] merits the terminal, as no bottom can be found at 300

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[1] Dýr is Θήρ, their, deôr, and deer, in Iceland especially applied to the fox, being the only insular beast of prey (Cleasby).

[2] According to some local authorities, Ísafjörð is the mouth of the Ísafjarðardjúp. Mr Shepherd (p. 92) lays down that the bay-head and the town are called Ísafjörð, whilst Ísafjarðardjúp is the name of the whole.

[3] Íssa being the genitive plural of Íss, ice. See page 5, "The Thousandth Anniversary of the Norwegian Settlement of Iceland," by Jón A. Hjaltalín, Reykjavik, 1874: the *Standard* (August 25, 1874) confounds this author with Dr Hjaltalín, "by far the greatest and most learned Icelander of the day." Some have erroneously derived it from Ísa or Ysa, a coal-fish or haddock, which is here plentiful: this *Gadus carbonarius* is known to western Scotland by many names. They are "cuddies" when six to eight inches long, excellent eating in October; when herring-

fathoms, and it gives a name to the northernmost Sýsla. There is a curious contrast between the shores of the great bay—the northern side, Snæfjallaströnd, is lee land, whose snowy heights are subtended by a smooth, straight shore-line, whilst the southern is jagged and hacked by currents, floes, and the violent north-wester. To starboard before we round the corner crouches the fair, green vale of Skálavík (hall bay), dotted with farms, and flanked eastwards by Stigahlíð, the "stair-ledge" or slope, whose reddish trap produces abundant Surtarbrand. Opposite the upper jaw of the mighty gape is Grænahlíð, streaked with thin verdure, and striped, despite southerly frontage, by snow descending to the sea. The central projection of Snæfjalla-ströndi, representing the tongue of the gape, is tipped by Bjarna-gnúpr, the bear's knoll, where the "old man with the fur coat" has often landed from his floating home, weak and famished, a ready victim to gun, club, and scythe. He is always the white ice-bear; the other two kinds known in Norway are strangers to Iceland.[1]

A green bulge, an *impasse* between two mighty blocks, with a little stream in the middle, shows us the farms of Hóll—fishing-boats on the shore, and houses built upon tumuli, to guard against the periodical ragings of the brook. These settlements upon the western and northern shores assume somewhat the aspect of villages; in the interior, however, here as elsewhere, they diminish to scattered farms. The path from Hóll to Eyri is a noted "ú-færa:" one would hardly suspect danger unless warned; yet during the course of the day we saw a land, or rather a stone, slip from the loose trap cliffs. Where the strand is barred by rocks the line runs up and down the *débris;* in

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sized they become "saythes," somewhat coarse of flesh; and when full-grown "stane-lochs," almost unfit for food.

[1] The *Ursus albus maritimus* or *Thalarctos* is called Bamsin and the female Bingsen: it is well known to be carnivorous, a "lahhám," as the peasants of the Libanus term their small brown bears (*U. Syriacus*): moreover, it rises upon its haunches to scalp the huntsman, like the Himalayan bear (*U. Thibeticus*). The two others common in Norway are the Hesta-biörn or horse-bear (the common brown *U. Arctos*), and the Myre or small bear (possibly a variety of the former, like the black bear of Europe). The latter is valued for its hams, as the paws of the great grizzly (*U. ferox*), the most savage of its kind, are prized in the Western States of North America.

other parts it lies upon the sands, and here the traveller pricks as fast as he can.

Presently we turned south into the Skutilsfjörð ("shuttle," *i.e.*, harpoon, firth), where the scenery became even more impressive. The bottom of the bay was split, and the two forks, separated by a central buttress, formed amphitheatres hoar with snow above and each traversed by its own runnel. The breadth of the mouth may be ten miles, and the twin cliffs of trap rose at least 1200 feet. Many streamlets dashed and coursed down the slopes; here and there they started from the ground, these features are always pointed out as curiosities, but they simply result from the drainage of the *couloirs* and snow wreaths disappearing under the rocky ground and reappearing, perhaps, hundreds of feet below. We hugged the eastern side of the picturesque firth, Arnanes, a flat tongue grown over with farms, in order to avoid a fronting spit or shallow. The continuity of the wall was broken by a deep "corrie," or curved scarp, at whose mouth stood homesteads with scattered sheep, apparently waited upon by ravens. We then rounded a shallow that continues the sandspit of Eyri, and the clear way was hardly the length of our steamer. There is a pilot for this bay, but Hr Wydholm is "very stiff and proud," demanding, for half-an-hour's work, the unconscionable sum of ten rixdollars specie. So we did very well without him; likewise did a plucky little Norwegian cutter which followed "Jón" into the inner harbour. Fortunately the weather was fine: in last May Captain Müller had been delayed two days by the snow.

Eyri, in the maps, is popularly known as Ísafjörð. The former term,[1] throughout the island, means a sandspit, in places equivalent to the Greek "Zankle:" it is applied to the sickle-like banks of sand and shingle, which we first noticed from the Esja summit; the effect of confluence, influent meeting effluent. Here the line sets off from the western shore and bends first to the south-west, and then to the south-east, in the shape of an

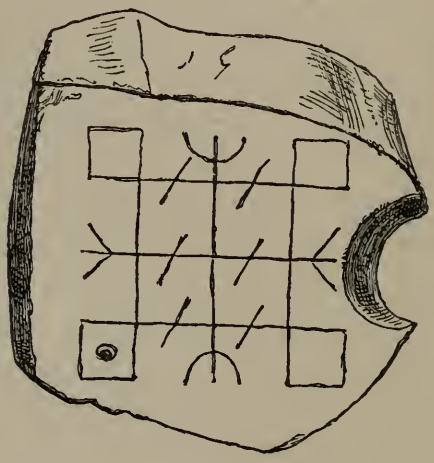
[1] It must not be confounded, as some travellers have done, with Eyra, an ear. Eyri is the modern form of Eyrr, the Shetland Urie, and the Swedish Ör: *e.g.*, Helsing-ör, our Elsinore. Eyr-byggjar are men who build in Eyris; and, hence, the "Eyrbyggja Saga." The feature, like the Holmr, was used for battle-plains; thus Ganga út á eyri, is to fight a duel (Cleasby).

inverted letter S, forming a close dock, seven fathoms deep, along shore: as we glided in, a perfect calm succeeded the cold and violent *rafales* outside. This Eyri may be 600 feet broad at the base; here are a few scattered hovels, a neglected grave-yard and a wooden church and steeple, with the general look of a card-house. About the middle it thickens to a quarter of a mile, forming the body of the settlement, a bit of enclosed meadow-land and a rough square, the houses being independently oriented, but mostly facing north. The top fines off into a spit sixty feet across, and prolonged under water: it carries a single establishment of five sheds, an incipient windmill, and tarpaulin-covered heaps of dried cod—we shall take in a small cargo of heads for Grafarós. The streets are made simply by removing the stones; we count five flags, all Danish; the old houses are faded black and white, the new pink, grey, and yellow, and there are three roofs of very bright pigs-blood, such as delight the Brazilian eye. A single landing-place and several abortive attempts at piers show private not public spirit. The settlement has been sketched by Mr Shepherd, whose frontispiece makes the Eyri far too narrow; also our view of the same was by no means so romantic and startling in colour as his.

After feeding we ascended the eastern precipice, which shows two distinct steps and a broken coping. The new comer would expect a dry walk over the grass growing below the shunt of rubbish; we now know it to be a quaking bog, the effect of retentive fibrous roots, even upon the rapid slope. Murmuring runnels, which from the shore appear mere threads, become deep gullies, garnished on either side with rocks and boulders, shot down from the perpendicular cliffs. The weather was that of August in England, fostering a pretty little vegetation, yet we soon reached a deep patch of snow. The drainage flows into the Fjörð, and the sea-water tasted almost sweet.

After a bird's-eye view of the settlement we returned on board. In all these places flaps of whale and porpoise meat hung out to dry, and huge vats and tuns, reeking with high shark-liver, diffuse an odour distinctly the reverse of spicy and Sabæan. The deck was crowded with open-mouthed sight-seers, who walked round us as if we had been lately floated over from

Greenland, and who, between cigar-puffs, loudly asked one another, "What *can* they be?" In the evening they will be "fou" and fond. On our return we were fortunate enough to meet Hr Thorwaldr Jónsson, son of our friend Hr Guðmundsson of Reykjavik: he speaks French, as *Médecin d'Isafjörð* on his card shows, and he kindly gave me an amulet of Surtarbrand, engraved with "runes"—the form is not found in Baring-Gould's collection.



THE AMULET.

But neither he, "nor any other man," could enlighten my curiosity as to the island which Pontanus, or rather his mapper, Giorgius Carolus Flandrus, places off the north-west coast. All being mere drongs and skerries, I was forced to the conclusion that "Insula Gouberman" is only the Gunnbjörn Skerries of Ivar Bardsen forced hundreds of miles to the east.

It was nearly ten P.M. when we steamed out of the Ísafjörð. We passed a number of shallow-branched firths, combining to form the Jökulfirðir, which well merits its name; at the bottom to the south-east rise the roots and outliers of the Dránga snow-dome. After some two hours' steaming we turned to the east and entered the "Cronian Sea," where old Saturn, planter of the vine, lies sleeping in his pumice cave. There was a solemn charm in this end of the world of men. An arch of golden gleam in the west threw a slanting light upon the noble bluff of Kögr (the "dogger"); and the giant range of trap bluffs which faces the Pole, forms

a worthy barrier to the icy ocean. The profile showed a thick ribbed curtain, topped by *chevaux de frise*, sharp-topped pyramids, sheer to the fore, as we might expect on a shore exposed to the whole fury of the north; the front view separated the three shells of cliff by hollows, with a dreary attempt at verdure. The Horn [1] was signed by a knob or chimney below the highest point; all present who knew the two, preferred Icelandic Cap Nord to the Nord Cap of Norway, though the latter lies far nearer to the Pole (N. lat. 71° 10′ 15″). As we gazed our full, a solid wall of sea-fog, which to the north wore the semblance of an island, and to the south-west mimicked an ice-floe, rose from the horizon and gradually wrapped in its grey pall the golden glories that clothed the splendid cliffs. The last look at the three waving heads sent me berth-wards to dream of the limestone billows of Syrian Blúdán and Marmarún.

July 1.

The culminating point of excitement had now passed. We were tired with craning necks backwards, and in the chill and cheerless weather of the next morning we cast languid glances at the coast. But for "earth's period," *the* Horn, we might have admired the tall and bizarre form of Kaldbakshorn (cold hill-peak) and the remarkable pyramid of Sandfell. We were now running down the great gulf Húnaflói, bounded west by the Stranda Sýsla and east by the long tongue of Húnavatn's Sýsla, which separates it from the Skagafjörð (naze firth). The shores are garnished with a multitude of unimportant islands, and cut with secondary firths and creeks, the western side being again much more torn and frayed than the eastern shore. At two P.M. we entered the narrow Hrútafjörð (ram's firth); the dreary low-banked sea-arm looked like the estuary of a mighty stream, yet it conducts only the mildest of streamlets draining the smallest of lakes. "Go to Hrútafjarðarháls!" I may mention, is here equivalent to sending a man to Jericho or—Halifax. The bluff eastern point rejoices in the short and handy name of Bálka-

[1] This common name for such features is one of the Semitic words (Arab. Karn) which has been naturalised in Aryan speech through Κέρας and Cornu. Another is "Botn," flat or low land, *e.g.*, Gulf of Bothnia, in Arab. Batn.

staðaneshöfði, head of the naze of Bálkastaðir or Balk- (bulk-head) stead.[1] On the western of the two dwarf holms, Hrútey, appeared a cross, warning us to respect the eider-duck; both belong to the Sýslumaðr, whose Bær is on the left bank opposite. From a little hollow in the right bank curled the thin blue vapour of the Reykir (hot springs), and south of it stood Thóroddstaðir, a house with five gables and large tún.

After eighteen hours' run we anchored in rapidly shoaling water, over a bottom of deep mud outlying black sand, at Borðeyri, the table-spit, so called because that article of furniture was found there: a miniature copy of our last Eyri, based upon the western side, projects a few yards to the south-east. Three plank-pierlets without caissons and removed, as usual, in winter, outlie two establishments; in Messrs Shepherd's (1862) and Baring-Gould's day (1863) there was only a single shed, deserted when the season ends. One is salmon-coloured, the other yellow-white; one flies a flag; both are double-storied, and both are surrounded by peat-houses. The scene is wonderfully animated; this is the opening of the "Handelstid," or annual fair, attended by all the country-side; one long day's ride brings men from Stykkishólm, and in forty-eight hours they can make Grafarós. Strings of ponies, somewhat better grown than usual, are descending the hills, and groups of farmers and peasants flock in to the two comptoirs, buying and selling for the year. They exchange rough greetings, stand on the shore staring with intense inquisitiveness, and scramble, like climbing bears, over the laddered sides of the two Danish brigantines, which have affected the place during the last nine years. This, with a considerable amount of hard drinking and loud hymn-singing at night, form the only visible humours of the *foire* in the far north. The stations of the Spekulants or shop-ships, and their length of stay,

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[1] Staðr (plur. Staðir), our "stead," secondarily means a church establishment, see, convent, chapel, and so forth. The "church contest," or struggle, between the clergy and laity about the ownership and administration of churches and glebes, which began at the end of the thirteenth century, and was partially settled by the agreement of A.D. 1296, has diffused this word far and wide through Iceland. Thus the heathen Fell, Hraun, Hóll, and Melr became Staðar-fell, Staðar-hraun, Staðar-hóll, and Mell-Staðar. On the other hand, the plural Staðir is frequent in local names of the pagan time, as Höskulds-Staðir, Alreks-Staðir, etc. (Cleasby).

are fixed by law, and all are Danes, the Icelanders have too little spirit for this work: the primitive system reminded me of the banyans at Berberah and of the trade-boats on the Amazonas. The holds are fitted up like shops, with desk and counter; the stores supply all the wants of a primitive people—dry-goods, clothes and caps, saddlery, wool-carders, querns of basalt, and spinning-wheels; sugar, grain, tobacco, and, especially, the rye-spirits, with which all purchasers, male and female, are copiously drenched. These, and a multitude of notions, are exchanged for wool and eider-down, dried-meat, salt-fish, and a few fox-skins.

We landed, for nearer inspection, in a dingy propelled by a single scull aft; a common style called Rempe Ruðir, which the little Reverend, who has a queer manner of "wut," translates "progressio podiciana." On shore the violent flaws and *grains* were stilled, and the sun shone with a genial warmth. The Sýslumaðr, in gold-laced cap and uniform buttons, made *acte de presence*, to keep order. The peasant women wore white head-kerchiefs over the usual black fez, and instead of shawls short fichus, which reached only to the waist; they managed their baggy petticoats with some art as they swarmed over the gun-wale of the store ships; and their side-saddles had unusually elaborate foot-boards, with backs of worked brass. Dry meat hung in plenty, but it was very like donkey, or the roast-beef of Sierra Leone. Heaps of wool lay upon the ground for sale; it is a very poor article, half-rotten before it is plucked off: after "gathering," it is scalded, or rather boiled, in caldrons, placed in frames, rinsed with cold water, and dried on stones or turf. The owners asked one shilling per pound, and consulted us about the chance of making money at Hull: a more likely spec. here would be to import wool.

We then strolled up country, beginning with the bare Melbakki, so common along the shores of these northern Fjörðs, a low dorsum of earth and stone, from which the snow has only just melted; too steep for turf, and kept bare by the furious winds. Often, as in this case, it is the bank of an old torrent-bed. To the north-west the land again seemed to offer a fair walk: "old Experience" had taught us that we shall have to bog-trot from

tussock to tussock, to paddle through ankle-deep waters, and to cross turf-fens, which look solid and yet admit you to the calf. The drainage of these hills would supply a little river, but, as usual, it sinks, or rather lies. The turbaries, so deadly to the growth of trees, were judged by the French expedition the only safe stations for observations of magnetism; elsewhere the cellular dolerite, containing oxydulated titaniferous iron, deflected the needle 1° to 1° 30′. Upon the slope we found what appeared to be a Lögberg (law-mount), artificially raised above the swamp; partly revetted on the top with turf, which had been stripped off for use, and encircled by a remnant of similar vallum. Ice appeared at the foot of the basaltic rises.

The summit, denoted by the usual "Varðas," commanded the nearer Heiði, a desolate land, a scatter of moor-ponds and bogs, everywhere alternating with heaps and swathes of stone, and with dark mounds wearing cravats of *névé*. To the south-south-east was a grand view of amphitheatral snow mountains; the western flank rose in a shallow dome of purest white: we judged it to be the Eyriksjökull, whose romantic and, of course, murderous tale has often been told; while to the east Balljökull (hard Jökull?), a lower elevation, showed dark-blue rocks, which had worn their winter garb to strips. These outliers were backed by a radiant semicircle of peaks, which, in the slanting sun, assumed splendid rainbow hues.

July 2.

The "Jón" made a long halt at Borðeyri; she found only two shore-boats for discharging goods, and these were dingies towed by a rope: it was past two P.M. before we steamed out into the great Húnaflói. "Skyey influences" appear to be peculiarly capricious on the shores of the Cronian Sea. Morning; cloudy, with southerly wind, and clear with north-easter, suggesting a "lady's passage." Noon; thermometer in sun 81° (F.), in shade 60°, although snow is upon the shore; with the sea, as at Granton, in alternate stripes of deep-blue and silvery azure. Afternoon; a Mediterranean, plus the normal long roll, and a biting breath from the north; and, later still, the sea-fog and a return of warmth under the protection of Skagafjörð. At five

P.M. we had turned the point Vatnsnes,[1] a long low projection from a high talus of stepped rock: hence we sighted the southern Jökulls towering above the lowlands and inlets of the shore—mighty masses of solid cloud, with true cloud floating above and around them. To the north-west, over the teeth and pyramids which jagged the shore of the Húnaflói, rose the Dránga Jökull, apparently supporting the firmament, Atlas-like, upon its vaulted head.

We then doubled at a respectful distance the long peninsula of Húnavatn, which, hilly and broken at the root, thins out into a cliffy point, and projects near Rifsnes the dangerous reefs of Skalli (the scald or bald head). Two French schooners from Dunquerque sailed leisurely by, with their rigging a mass of drying fish: after safe return these cod-fishers will pilgrimage to Nôtre Dame des Dunes. The behaviour of the ice-fog gave us some concern, we were now in N. lat. 66° 10′, and this was the only night that would offer a chance of enjoying the midnight sun. The mist came up in a white transparent line raised by the abnormal heat, and at times a low, solid bank, precisely imitating floe-ice in all points except being stationary, threatened, as is its wont when the light of day lies low, to invade the land.

As time neared the noon of night, the burnished circle, utterly shorn of its beams, seemed almost to stand still: when suspended about a diameter and a half above the ocean, it changed to a long oval, to a mushroom with distinct columella, to half a sovereign, and finally to a fragment of golden egg, which seemed to indent the blue horizon. In the latter phase it held its own till the bell struck, when the light of night began to rise once more. The spectacle was a lecture upon such Eddaic and Skáldic phrases and periphrases for the precious metal, as the Eld Særar, "ocean or water flame;" the "sea's bright beams," or "lowe of the waves;" the "swanbath's rays;" the "ore of the Rhine" (any river); and the "resplendent radiance of the flood."

This was our farthest northern point—

"Sistimus hic tandem, nobis ubi defuit orbis."

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[1] So the point was called by all on board; the map gives Krossanes (cross naze).

We failed to sight inhospitable little Grímsey, which employs its spare hours in adorning porridge-pots with the Runic knot or snake.

When abreast of long, high, and broken Málmey (Malm or sand isle), bluff at both ends, we had fairly entered the Skagafjörð, which my classical friend translates "*Sinus qui eminet;*" he is less happy with Grafarós, *ostium sepulturæ;* Gröf, as in "Grafar-lækr," here means the deeply-encased bed of a stream. A little farther we left to starboard a triad of islands classical in Iceland story. The northern rock-needle bears the common name Karl (old man), whose hip, the Kerlíng (carline), to the south, suggests a ship under sail. The middle, and by far the largest, feature is Drángey, an area of 800 square yards, rising steep-to some 600 feet high, and inaccessible except on the south, where the cliff breaks, and where adventurous cragsmen swarm up to rob birds' nests. It is one of the richest of its kind, and it is known far and wide as the last refuge of Grettir Ásmundarson, popularly "Grettir the Strong." The millennial lithograph simply says of this strong man, "outlaw for twenty years, and died in this capacity." While telling the tale of his well-merited death, the Icelandic speaker's eyes, to my wonder and confusion, filled with tears: I could not but think of my poor friend James Hunt, who died of a broken heart because "Anthropology" was not welcomed by the "British Ass." The "Oxonian" abridges the prodigious long yarn spun by the Gretla, and shows the "William Wallace of Iceland," as the outlaw is called by the admirers of muscular un-Christianity, to have been, *pace* Mr Morris, even for Iceland, a superior ruffian. With few exceptions, we may say the same of the Saga heroes generally, and it is ethnologically interesting to contrast their excessive Scandinavian destructiveness with the Ishmaelitic turn of the Bedawin —the reader has only to glance at the pages of Antar, translated by Terry Hamilton. But the Arab, though essentially a thief and a murderer, boasting that blood is man's only dye, and that battle is to him like manna and quails, has a soft corner in his heart which the Iceland poet lacked; he was chivalrous as a knight-errant in his treatment of women; he was great upon the subject of platonic love, whose place in the hyperborean

north is poorly occupied by friendship, however tender and true; his poetry was inspired by the sun, not by eternal ice and snow; and, like all the peoples of the glowing south, his fiery savagery is gloomed by a peculiar and classic shade of sadness. Witness this address of the dying Bedawi to his fellow-clansmen:

"O bear away my bones when the camel bears his load,
And bury me beside you, if buried I must be;
And bury not my bones 'neath the burden of the vine,
But high upon the hill, to be sighted and to see;

"And call aloud your names as you pass along my grave,
For haply shall the voice of you revive the bones of me.
I have fasted with my friends during life and in my death;
I will feast with you the day when the meeting shall be free."

. . . . . .

We may compare the sentiment with that of the Roman epitaph,

"Hic propter viam positus
Ut dicant prætereuntes
Lolli, vale!"

And one might quote by the score such inscriptions as—

"Have, anima dulcis!"

which breathe only the most tender melancholy. This sentiment, apparently unknown to the rugged and realistic soul of the north, is felt deepest in the brightest climates, for instance, amongst the Hindús, and generally the races which inhabit the "Lands of the Sun." Nor amongst the Arabs do we find the abominable heroines of Scandinavia; "the grimmest and hardest hearted of all women," adulteresses all and murderesses, justifying the Norsk proverb, "Woman's counsel is ever cold (cruel)."

The eastern shore of the Naze Firth then showed Thórðarhöfði, a majestic headland of black lava, coiled and writhed, whose central hollows are striped with yellow clay washed from above; whose upper crags lodge the eagle and his brood, and whose base is caverned by the ceaseless onslaughts of the waves. At first it seems an island, backed by its lakelet, the Höfðarvatn, but it is connected with its mainland by strips of natural causeway to the north and south, not unlike Etruscan Orbetello. Wild strawberries are said to flourish in the well-sheltered hollows.

From about Grafarós it wears the aspect of a couchant lion, and doubtless it was of old, like Helgafell, a Holy Hill. The Thórðr who gave it a name was an "illuster and vailzeand compioun" of Irish blood and fifth in descent from Ragnar Loðbrok (hairy-breeks),[1] one of the most unpleasantly truculent persons in Scandinavian myth. His epicedium or death-song, of course composed for and not by him, the only refrain of whose twenty-nine stanzas is—

"We hewed with the hanger" (Hiuggom ver með hiaurvi—*Pugnavimus ensibus*),

very adequately represents his sentiments and his career: it reads as if it had been inspired by the Destroying Angel. The sooner this style of literature, which deals in every manner of ——cide from parricide to vulpecide, becomes obsolete in Iceland the better. Imagine a decent, respectable Protestant paterfamilias, by way of whiling away the long winter evenings, reading out these revolting and remorseless horrors to his wife and daughters: I should feel as if treated to the Curse of Ernulphus.

The next feature was Hofsós, a scattered settlement, with its chapel, first a pagan temple and then a Catholic church; it is marked by a hill rising bluff above the Unadalr ("Wone" or dwell vale), a little stream which accounts for the term "oyce." A mile or so farther south lies Grafarós, and here we anchored, after a pleasant cruise of fourteen hours from Borðeyri. This comptoir, chosen by Mr Henderson of Glasgow, is very badly placed: the norther raises a surf which can make landing impossible for a fortnight, and, as we could see, the south wind at once breaks the Skagafjörð into dangerous waves. Surely safe ground could be found under the lee of the grand Thórðar-head.

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[1] The Lodbrokar Kviða (Lodbrog's Quoth) or Krákumál, so called from the "mythical lady" Kraka, was translated (1782) by the Rev. James Johnstone, A.M., chaplain to the British Embassy at Copenhagen. It is given by Henderson (ii. 345-352), who believes—*O sancta simplicitas!*—that the ruffian, who probably never existed, himself composed the "warlike and ferocious song." The word Kviða, or lay, derives from Kveðja, cognate with the English "quote" and "quoth."

July 3.

Apparently the rule in Iceland is, that a fine day brings foul weather, and July 3 was no exception. As we rose, a solid bank of rain stood high in the north, and presently the Storm-King rode forth, beating down the white heads of the angry billows. It was Ahriman waging eternal war with Hormuzd; the battle of Osiris and Typhon; the war of Baldur and Loki. In the course of the day, the gale forged round almost to the south, and the alternations of mist, drizzle, and bright sunshine formed an Ossianic framing highly appropriate to the picture: like the Scottish Highlands, it would have looked ridiculously out of place under an Italian sky.

The Skagafjörð is held to be one of the most picturesque, as well as fertile and populous, districts in Iceland, wanting only the "hair of the earth animal"—wood. The firth, a riverine sea-arm, ten miles broad, is the embouchure of that formidable stream the Jökulsá Vestri (western), which, like the Blandá or Blandwater, drains the central Hofsjökull—the southern face, Arnarfellsjökull, discharging the much more important Thjórsá. Flowing from south to north, before feeding the bay, it bifurcates, forming a delta known as Hegranes (Hern-naze) Island, and famed for beauty. On both sides, rugged and precipitous shores are divided by ravines and valleys which, after an hour's rain, pour turbid yellow streams into the dull-green receptacle. The southern part of the western bank is subtended by the Tindastóll (peak-host), a well-known name: older travellers talk of "precious stones, probably opals," being found in abundance among its ravines, of onyx, zeolite, and chalcedony, and of "caves containing curious crystals." To the north and south, the wall-coping is broken and jagged; the middle length shows straight and regular lines, with numerous strata symmetrically piled.

The eastern shore of Skagafjörð, near the anchorage-ground, is of black sand and shingle, with columnar basalt in places, and capped by a long bare "Melbakki" some seventy feet high: its background rises in detached hills and lines of bluff, counterparts of the Tindastóll in miniature, and copiously streaked with snow. The regular steps and stratified lines here dip to the north.

The bottom of the firth disclosed a grand landscape of sky.

Now a glint of sunshine settled upon snowy top and glaucous slope, then a white mist robed and capped the shadowy mountains, catching the reflection of Bifrost, the bridge of the gods, a fragment of gaudy rainbow. Anon a span of pale-blue firmament contrasted with the mackerels' backs and mares' tales to windward; whilst to leeward the dark curtain of purple cloud, hanging in rugged edges over the red and black hills, made the distances dim, dimmer, and dimmest. The inevitable accompaniments of this feature were the ghostly forms of pale birds fighting with the wind; the *âmes perdues* which attract the voyager's eye on the beautiful Bosphorus.

We landed to inspect the "one-horse" settlement of Grafarós, which consists of a small temporary landing-place, a tarred store, sundry stone-and-peat huts, and a double-storied red house flying a flag; a few farms are scattered about inland, as well as on the shore. A single schooner lay at anchor. North of the comptoir, and forming a bay in the bare raised bank, is the "ostium" of the Deildardalr (dole-dale)[1] river, a tenth-class Icelandic stream, which, despite its low degree, can look first-rate in violence. There is a ford near the settlement, but elsewhere the water courses over a succession of steps and ledges, which would deter anything but that wild horse who is known to swim the wilder flood. By this time we had seen enough of "Hofs," and we contented ourselves with strolling up the warm and genial valley, a bed of violets.

Grafarós was formerly, and is still at times, frequented by English smacks in search of whale and seal oil. These cockle-shells, manned by four and five men, the "little friggits" of our ancestors, not larger than the Icelandic "sharker," work their course by dead reckoning and often come to grief. It is the terminus of our voyage, and we could only regret that the "Jón" had not orders to make a circuit of the island—regrets tempered, however, by the thought that we had seen by far the fiercer and the more interesting half. No better or easier way than this to form a general idea of the formation; it requires only supplementing by a few cross-cuts through the interior.

[1] This common term is explained in Chap. XIII.

The students had all left us, and here our now pleasant party broke up. The bishop's daughter and her two friends had the choice of riding some twenty miles round the Skagafjörð head, or of crossing it by boat, an easy process which, however, did not seem to have charms for them. We bade affectionate farewell to Síra Guttormr, whose beat is from Rípr (the crag) in Helganes to Keta near the north-eastern extremity of the Húnavatn peninsula—he seems to look upon it as a mean place. The reverend has no pay, properly so called, and his "living" is expressed by the contributions of his parishioners: truly a man must have a vocation for such a life!

Late in the afternoon the "Jón" turned his head northwards, and on July 6 steamed into Reykjavik harbour. We shook hands with our excellent captain, and heartily wished him every success, and bade an adieu which was destined to be an *au revoir*.

CHAPTER XI.

TO HEKLA AND THE GEYSIR IN HAUKADALR.[1]

THIS is indeed a Cockney trip, but a visit to Iceland without it would be much like Dante's Commedia with the Inferno omitted.

SECTION I.—TO KRÍSUVÍK, THE WESTERN SULPHUR-FIELD.

Mr Chapman and I determined to secure comparative novelty by a "hysteron proteron," beginning with the "Cope" and ending with the Gusher and the Thingplain Lake.

We hastily collected the small quantity of *harnoys de gueule* absolutely required—man eats less when travelling, and more when voyaging. Our stores represented a ham, one serving for one mouth per month; a couple of sausages, to be avoided when thirst is threatened; four loaves of rye-bread (each 6 lbs. = one man per week); snuff, cigars, and pigtail for friendship; small change for £5; and, lastly, two mighty kegs of schnapps, the load of one-twelfth our carriage. The Fylgjumaðr (leader) was Paudl (Páll) Eyúlfsson, before mentioned as the "French guide;" our Lestamaðr ("last" driver) was "Smalls,"

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[1] I know no reason why we should conserve such veteran blunders as "Hecla" and "Geyser." The latter has already been explained. The former, whose full form is Heklu-fjall, derives from Hekla (akin to Hökull, a priest's cope), meaning a cowled or hooded frock, knitted of various colours, and applied to the "Vesuvius of the North," from its cap and body vest of snow. Icelanders usually translate it a chasuble, because its rounded black shoulders bear stripes of white, supposed to resemble the cross carried to Calvary.

alias Sigrbjörn Björnsson, fourteen years old, and four feet nothing: we are careful to see that they do not monopolise the very best of the eight riding-horses. We ourselves at once become Martednn (Marteinn) Kaupmansson and Ríkarður Burtonsson; and thus having borrowed as much local colouring as possible, we leave, nothing loath, the hard-soft bosom of semi-civilisation.

Spurring hotly over ground now familiar (July 8, 1872), we delayed a few minutes at Foss-vogr to inspect the "sedimentary and sandstone stratifications," found so interesting by older travellers in a purely volcanic island. They suggested, in early times, to daring spirits that granite might not be Plutonic, and they made the devil-may-care doubt even the eruptive origin of basalt. The travels of Von Waltershausen have settled Foss-vogr and its Palagonite.

There was nothing to keep us at Hafnafjörð, after a longing glance at the "Jón Sigurðsson," which lay in harbour. A man happened to mention that the one herd of reindeer still haunting this part of the island had been lately seen; it was not our fate to sight them.

At four P.M. we inspected the Kaldá—an exceptional feature. Rising from a little tarn in the northern flank of the lone hill Helgafell, it winds westward down a shapely river-valley. Half of the stream suddenly disappears in a hollow of the right bank, a little below the farm crossed by the high road or path, and the remainder follows suit about two miles farther down. The feature suggested a limitation of the accepted dictum, "Calcareous rocks are almost the only ones in which great caverns and long winding passages are found." This is true of water-made passages, where carbonic acid has dissolved the limestone; the cooling of the upper lava crust has the same effect in Plutonic formations. The course of the Kaldá is very badly traced in the great map; nor does the latter show where the lower stream reappears.

The next feature of importance was the Lángahlíð, a stepped and buttressed block of trap like Esja, the Akrafjall, and the Skarðsheiði. A tolerably regular triangle to the south-west, it acts bastion to the great lava-plateau which extends from the

Thingvallavatn, and our morrow's ride will subtend its southern flank. Immediately below the western slopes, which are regular, lies the Kleifavatn (cliff-water),[1] a lake of intensely gloomy shore. The dark waters, ending south in a swamp, were lashed by the wind into mimic waves, and the shores were grisly masses, standing and fallen, of dark Palagonite, a conglomerate of small and large breccia, easily washed into gaps and clefts, arches and caverns. I could not but remember the Lake of Hums so similar, and yet so different, under the glowing Syrian sky; the picturesque contrasts of cultivation and desert contrasting with the lava-bound water, and the memory-haunted stream which once found a mouth at Rome—

"In Tiberim defluxit Orontes."

Cutting across a hill-brow we sighted a tall, white plume whose fibrils, causing many a cough, suggested the end of this day's march. The Icelandic traveller who has not read "The Great Sulphur Cure" of Dr Robert Pairman, often lands with the idea that inhaling sulphur-vapour is unwholesome, as the sulphuric acid and the sulphuretted hydrogen are decidedly unpleasant: he soon corrects the impression, finding the people of the two great brimstone centres exceptionally healthy. The Krísuvík diggings are upon a line of volcanic hills, running from north-north-east to south-south-west, and their irregular and tormented flanks contrast sharply with the monotonous Lángahlíð wall, rising opposite them. The "Ketill" (caldron) of Krísuvík, a huge "corrie," whence the puffs come, lies high up: the four "Brennisteins Námur" are low upon the eastern flank, with the little blue pond, Grænavatn, farther to the south. The scene is that of solfataras generally, a distempered land of disordered cuticle, bright red, brass-yellow, slate-grey, pink, purple, pale green, brown-black, and leprous white; the water is milky and slimy, and even the dwarf willow and juniper cease to grow. "Exhalations of sulphurous acid, sulphuretted hydrogen, steam, and sulphur, burst in wild disorder from the hot ground."[2]

[1] "Kleifar" is a local name in West Iceland, from Kleif, a ridge of cliffs or shelves in a mountain-side (Cleasby).

[2] Professor Tyndall (loc. cit.) tells us that the "two first gases cannot exist

Martednn looked at Ríkarður, and *vice versâ;* both had expected not a single block, a mere patch, but a sulphur region to be measured by many square miles.

We passed two huts, one of iron, the other of wood, with ore-heaps lying around them, and, scrambling through a bog, we rode up to the Krísuvík chapel and the three-gabled farm-house of a little widow, Mrs Ingveldr Hannesdóttir. The district is tolerably populous; on the flanks of the various rises we counted five farms, fringed with haystacks, under sticks and turf, and white ponies dotted the long, swampy expanse, between the Krísuvíkfell, a lump north of the chapel, the Arnarfjall to the south-east, capped by a spitz or bec, and the long slope leading to the Krísuvíkurberg, the precipice some 200 feet tall which boldly faces the Deucaledonian main. Unhappily Henderson's fine port is utterly absent; on the other hand, it is said that an easy line of tramway has been traced from the head of the Kleifavatn to Hafnafjörð.

The day's work surprised us, we had not yet realised the shortness of the distances travelled over. This mild march also has been called a "maniac ride"—"one of the wildest in the world." It is, however, only fair to own that we took the lake road, which is not laid down in the map, and that a few yards on either side of the way would offer as many difficulties as the horseman, however ambitious, could desire.

The steepleless chapel, which was not worse than that of Blúdán, had lost its key, and when the latter was found, the cabin proved a store and a lumber-room: clothes hung to the seats, milk stood to cream, and salt barrels cumbered the floor. A coffin, unfurnished, also stood on a beam: the idea underlying this premature precaution is that it prolongs the owner's life. Here the chapel is the "mountain-stove" of Norway, the Indian traveller's bungalow, and the Sind mosque in which Kafirs ate pork and drank wine. We pitched the tent near the byres, where broken bottles showed the habits of civilisation,

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amicably together. In Iceland they wage incessant war, mutually decompose each other, and scatter their sulphur over the steaming fields. In this way the true solfataras of the island are formed." He derives the vapour of sulphur in nature from the action of heat upon certain sulphur compounds.

and slept despite the normal evil, cold feet caused by riding in a hard head-wind. The frequent weary halts to adjust pack-saddles should be utilised for restoring circulation. "*Les picotements sont plus incommodes que le froid lui-même,*" justly remarks M. Gaimard's expedition; and the French doctor advises the feet to be gradually warmed, or they will swell and cause *demangeaisons*, which prevent rest. Above all things avoid the Brazilian wrinkle, so valuable against damp in tropical climates —a glassful of spirits poured into the riding-boots. We must not leave the sulphur-field without some notice of the supply.

From Captain, now Commodore, Commerell's Reports, dated Leith, July 9, 1857, we learn that "the mines of Krisuvik were worked from 1723 to 1730, with considerable profit; during that year, all the sulphur consumed in Denmark and Norway and the Duchies was obtained from there, but one of the owners, who had also been the director in Iceland, dying, the mines were abandoned in consequence."

"In 1833, a merchant of Copenhagen, a Mr Kenidzen, obtained one large cargo of sulphur from Krisuvik; the affair was managed through an agent or factor, whose mismanagement was the principal cause of failure, since then only a few tons having been taken by the peasants for home use."

"The actual extent of the sulphur beds it is quite impossible to calculate; but from Krisuvik to Hengill (the mountain mass south-west of the Thingvallavatn) forty-seven have been discovered, the distance of the latter (former?) place to Havnefiord (Hafnafjörð) is from fourteen to fifteen miles, but the road is much more hilly. The deposit of sulphur I personally saw at Krisuvik must amount to many thousand tons; hitherto the sulphur taken away has been reproduced in two or three years, all the mines, or nearly all, being in a living state. Sulphur in a pure state, I have little doubt, could be supplied at Havnefiord for £1 per ton."

We are also told that "Dr Hjaltalín, an Icelander and mineralogist, who was ordered by the Danish Government to report on the sulphur beds, informed Captain Commerell that those at Krisuvik could be worked very easily, producing a large

amount of sulphur, and as a speculation would pay very well indeed."

I need not here enter into the history of the Krísuvík diggings since the date of Commander Commerell's report, or during Mr Bushby's concession. Suffice it to say that the concession has now been granted to Englishmen, and that Messrs Randall and Thorne, Curtis and Seymour, are the actual owners. Until 1873, I believe, nothing has been done in the working line—we shall hope to see more activity soon.

After expressing my surprise, as bound to do, at the smallness of the Krísuvík area, it is only fair to own that Commander Commerell's third paragraph, if correct, is most hopeful. The supply which is puffed away in air can be controlled by walls and roofs, upon which the vapour would be deposited, and thus the period of renewal would probably be reduced from two or three years to the same number of months. As regards Dr W. Lauder Lindsay's assertion that whilst crude Sicilian sulphur contains 80 to 90 per cent. of pure ore, and that of Krísuvík from 96·39 to 98·20, I am unable to pronounce judgment; but my suspicion is that severely picked specimens were used as averages.

Since my return from Iceland, Mr Charles W. Vincent, F.C.E., published in the *Journal of the Society of Arts* (January 17, 1873), a valuable paper "On the Sulphur Deposits of Krisuvik, Iceland." It is here reprinted with his express permission: the importance of the subject will excuse its length, and the reader will exercise his undoubted right of "skipping."

"The canton of Krisuvik, in the south-west corner of Iceland, has long attracted great interest, on account of its boiling mud caldrons, hot springs, and above all, its 'living' sulphur mines these are all arranged in lines, evidently corresponding to the great volcanic diagonal line stretching from Cape Reykjanes to the Lake of Myvatn.[1] At the present time the greatest amount of volcanic activity is manifested at the southern end of this line.

[1] I have denied the existence of this diagonal.—R. F. B.

"In the last century it was the northern end of the volcanic diagonal, near about Myvatn, where, according to the Icelandic records, the kind of pseudo-volcanic action was most vigorous, by which the boiling springs are set in operation and the sulphur deposits are formed; but a violent eruption of the mud volcano Krabla, to a great extent buried the then active strata beneath enormous masses of volcanic mud and ashes, so that the energy has been probably transferred along the line southwards.[1]

"The Krisuvik springs are in a valley beneath some high mountains. They are reached by a track, so narrow that there is no more than room to enable horses to pass along it—across the brink and along the side of a vast hollow, termed the 'kettle.' Following this rude track, the 'Ketilstip,' the summit of the range of hills, is reached which overlooks Krisuvik. In the midst of a green and extensive morass, interspersed with a few lakes, are caldrons of boiling mud, some of them fifteen feet in diameter, numberless jets of steam, and boiling mud issuing from the ground, in many instances to the height of six or eight feet. Sir George Mackenzie (who was accompanied by Sir Henry, then Doctor, Holland, now the President of the Royal Institution), in his justly-celebrated 'Travels in Iceland, in 1810,' gives a vivid word-picture of the scene. 'It is impossible,' he writes, 'to convey adequate ideas of the wonders of its terrors. The sensation of a person, even of firm nerves, standing on a support which feebly sustains him, where literally fire and brimstone are in incessant action, having before his eyes tremendous proofs of what is going on beneath him, enveloped in thick vapours, his ears stunned with thundering noises—these can hardly be expressed in words, and can only be conceived by those who have experienced them.'[2]

"On the other side of the mountains subterranean heat is also manifested, and hot springs, accompanied by sulphur beds, are also found; but they have not been as thoroughly examined

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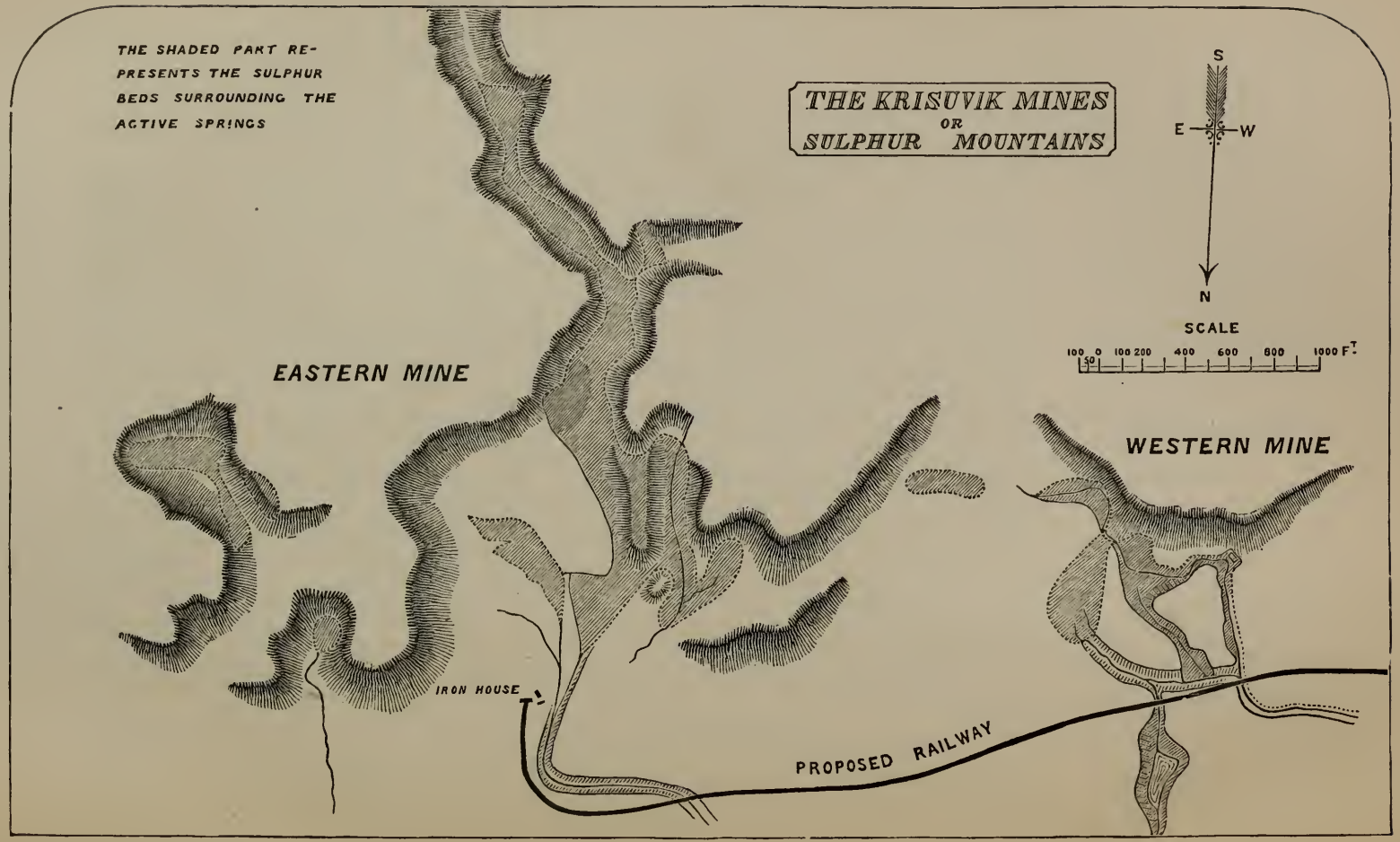
[1] The Journal shows how great this mistake is.—R. F. B.
[2] The description is prodigiously exaggerated.—R. F. B.


THE SHADED PART REPRESENTS THE SULPHUR BEDS SURROUNDING THE ACTIVE SPRINGS
THE KRISUVIK MINES OR SULPHUR MOUNTAINS
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EASTERN MINE
WESTERN MINE
IRON HOUSE
PROPOSED RAILWAY

as those in the valley, and are represented as being less active.

"Mr Seymour, who has spent many months at Krisuvik, tells me that the sulphur beds on this side have been submerged by the clays washed down by the winter rains, and are, for the most part, now completely overgrown with grass. On digging beneath the surface, however, the sulphur earth is found to be only a short distance down, and on analysis the percentage of sulphur in one bed, 116 yards long, running up the side of the mountain, was discovered to range between 64 and 65·5. Here the earth was completely cold, and all further deposition of sulphur appeared to have ceased.

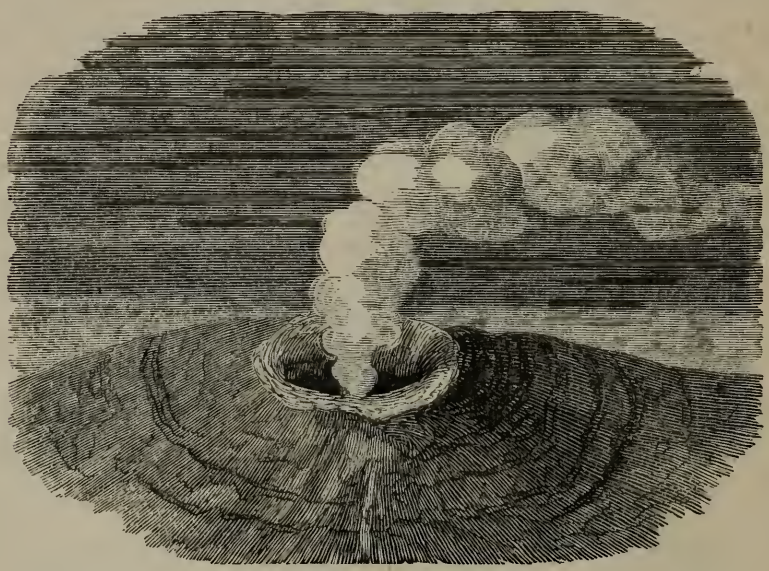
"In the valley itself the springs are not always visible at the surface, being so completely covered by the earth that it is only by piercing through the crust of indurated sulphur earth, that their presence is discovered. Sometimes the explorer is made unpleasantly aware of the insecure nature of his footing by falling through, and thus opening up a fresh thermal spring. The late Sir William Hooker, when visiting this place, in endeavouring to escape a sudden gust of strongly odorous vapour, jumped into a mass of semi-liquid hot earth and sulphur—and but for his presence of mind, in throwing himself flat upon the ground, would have sunk to a considerable depth; as it was, the difficulty of extricating himself was very considerable.

"The surface of the ground is covered in many places with a crust of two to three feet in depth of almost pure sulphur; and in the valley, where the steam jets are protected from the extreme violence of the wind, the sulphur is deposited tolerably evenly over the whole surface. If it were not for the ever-varying direction of the wind, the sulphur would, Captain Forbes is of opinion, be precipitated in regular banks, but it hardly ever falls for twenty-four hours in one direction, the wind capriciously distributing the shower in every direction.

"It has been suggested by those who wish to utilise the immense sulphur-producing power of this wonderful locality, that chambers should be erected (Sir George Mackenzie), or walls built up (Dr Perkins), by which means the force of the wind

being broken, the sulphur would be quietly floated to the ground, instead of being carried up the sides of the hills,-and thus more widely distributed.

"With little variation the general appearance of the 'solfataras' over the space of twenty-five miles along the volcanic diagonal is much alike: an elevation about two feet high and three feet in diameter, which is composed of a dark-bluish-black viscid clay, forms a complete circle round the mouth of a medium-sized spring. The water is sometimes quiescent, and sunk about two feet within the aperture; at other times it is ejected, with great hissing and roaring noise, to the height of from five to eight feet. At all times clouds of steam, strongly impregnated



THE SULPHUR SPRING.

with sulphuretted hydrogen and sulphurous acid gas, issue from the orifice, both of which, during an eruption of the water, are greatly augmented in quantity. From the dark coloured and elevated margin of the fountain the yellow crust of crystallised sulphur extends a great distance in every direction. Columns of steam ascend from numberless points in the whole district, which are thus impregnated; and thus it is that, apparently for ages past, sulphur has been gradually heaped up in this locality till there are actually hills, which, as far as they have yet been pierced, show sulphur earth to be their main con-

stituents. Hence they have acquired the name of the Sulphur Mountains.

"The soil is of different colours, but most generally white. It is, in the vicinity of the springs, a viscid earth, less plastic than clay, and more readily broken.

"When excavations are made into this earth, it is found to be composed of multitudinous layers, of different colours or shades of colour, each layer being quite distinctly divisible from those above and below it, though frequently no more than an inch or two in thickness.

"It is much to be regretted that the good example set by Olafsen and Povelsen of investigating the nature of the earth's crust round about the solfataras, by piercing the soil, has not been more frequently carried out. In the summer of last year one of the suggestions which I made for the instruction of an expedition to this place, was that boring implements should be taken out and extensively used; but accident prevented the necessary appliances being forthcoming at the right time. I believe, however, that one of the chief features in the expedition which is to set out in March, will be the thorough examination, to as great a depth as practicable, of the strata in various parts of the Sulphur Valley.

"The spring chosen by Olafsen and Povelsen as the subject of their first experiment, was one which had made its appearance since the preceding winter, and which was just beginning to be surrounded by other mud springs and jets of steam. The ground was still covered with lovely verdure, and charming flowers were abundant, even at the very verge of the caldron of hideous hue and odour. A short distance from this opening they established their boring apparatus. The sequence of the layers was as follows:

"1. Three feet of reddish-brown earth, of a fatty consistence —of the ordinary temperature; at the bottom heat was perceptible to the touch.

"2. Two feet of a firmer kind of earth, nearly the same in colour as the first layer, unctuous to the touch.

"3. One foot of a lighter kind of soil.

"4. Five feet of a very fine earth of different colours, the first

two feet being veined red and yellow, with streaks of blue, green, red, and white intermingled. The lower portion of this earth was somewhat firmer than that which covered it. The heat of this thick bed was so great that the soil extracted by the auger could not be handled until it had been for some time exposed to the air.

"5. One foot of a compact greyish-blue earth.

"6. In tapping this bed, which was four feet nine inches in thickness, and consequently at a depth of about twelve feet, water was first met with. It was found by comparison that the level of the water in the boiling mud spring coincided at this time with that of the water thus discovered. The heat was now very great, and a constant hissing and bubbling could be heard as proceeding from the bottom of the hole which had been made.

"7. Nine inches of greyish-blue earth.

"8. One foot six inches of a similar unctuous earth, containing many small white stones. This was the hottest layer of any yet pierced; the buzzing, humming noise was now much louder than before.

"9. Three feet of the same kind of clay, but much harder and more compact; this layer was also full of small, round, white stones.

"10. Six inches of a violet tinged earth, very greasy to the touch. In this bed the heat sensibly diminished.

"11. One foot six inches of red and blue clay intermingled. The heat continued to diminish very fast.

"12. One foot of reddish-looking clay, the temperature remaining about the same.

"13. Six inches of yellow and red clay.

"14. One foot of a greenish coloured earth, much less coherent than the previous layers. Here the heat again began to increase.

"15. One foot six inches of blue clay, filled with small pieces of white tufa. This bed was much hotter than either that above or that below it.

"16. One foot three inches of soft blue clay.

"17. Nine inches of an earth, easily pulverised when dry,

which, whilst moist, was of a violet colour; on exposure to the air, however, this rapidly changed to a chocolate brown. The heat was again augmented as the centre of the bed was approached.

"At thirty-two feet the full length of the boring implements was used up; but from the set of the country in the vicinity, the experimenters believed they were close upon basaltic rock, when the heat probably ceased.

"In digging for the peculiar kind of brown coal which they call 'surturbrand' (a kind of fuel very much resembling Irish bog-oak, which can be used for like purposes), the inhabitants frequently go as deep as twenty-eight feet. They report that before reaching this depth they frequently pass through three or four beds of blue, yellow, and brown clay, and almost invariably find that the layers of blue clay are much hotter than any of the other strata.

"A second trial of the soil was made in the neighbourhood of some recent springs, farther to the east. The activity of the agencies at work here appeared to be greater than in the former case, and to have been longer in operation. The whole surface was thickly covered with sulphur, in a finely-divided state; there was much gypsum, and a large efflorescence of feathery alum. Thousands of very minute holes were discoverable on close examination, through which continuous jets of steam, sulphuretted hydrogen and sulphurous acid gases were emitted.

"An attempt was made to dig with spades; but the soil was found to be so hot, whilst the footing was at the same time so insecure, that it could not be persisted in. A spot some distance farther off was therefore pitched upon, where the earth was firmer and colder. The borer pierced through six feet of blue clay with great facility, the lowest portion being extremely hot. After this depth the earth became rapidly softer, at the depth of seven feet the same peculiar bubbling noise before noticed was heard. Continuing to bore, the bottom of the hole appeared to be in a state of ebullition, a boiling liquid being ejected in the narrow space around the handle of the auger with extraordinary violence, and no sooner was the tool withdrawn

than a thick black fluid was ejected from the orifice to the height of several feet. A short time afterwards the jet ceased, the subterranean fire appeared to have expended its fury, but it soon recommenced with redoubled activity to dart forth fresh jets of steam and black, muddy water, continuing to boil and dance with but slight intermission. It appeared, therefore, evident that the result of this experiment was the premature formation of a fresh hot spring, which would otherwise have been, perhaps, a considerable time in forcing its way to the surface.

"It is somewhat to be regretted that no one amongst the numerous eminent men, men accustomed to experimental investigations and acute observers, who have since traversed this region, should have investigated the question of the origin of these hot springs and sulphur deposits from the point of view which was thus displayed by these careful and painstaking philosophers.

"The phlogistic theory being generally accepted in their day, and the chemistry of the earths and metals being in a very undeveloped state, we cannot now accept to its full extent the explanation they put forth of these phenomena; but the facts they disclose appear to me to be of the highest value, and to afford a clue which, if carefully followed, may lead to discoveries of much importance in the domain of volcanic energy.

"The conclusion they drew from their investigation is, that the hidden fires of Iceland dwell in the crust of the earth, and not in its interior; that the boiling springs and the mud caldrons certainly do not derive their heat from the depths of our globe, but that the fire which nourishes them is to be found frequently at only a few feet below the surface, in fermenting matters, which are deposited in certain strata.

"By their theory the gases from the more central parts of the earth penetrate these beds by subterranean channels, and so set up the chemical action, producing fermentation and heat, these channels also forming the means of intercommunication between the separate sites of activity, and equalising and transferring pressure.

"To return to their facts. They further observed that the heat is invariably found to be greatest in the blue and bluish-grey earth; that these earths almost always contain sulphuric acid; that they contain also sulphur, iron, alum, and gypsum; and lastly, that finely-divided particles of brass-coloured pyrites are visible throughout the whole of the beds when heat exists.

"Sulphuric acid is found in the hot beds above and below that which is the hottest, but this latter manifests no acidity that is sensible to the taste.

"Sulphuretted hydrogen is continually evolved from the clays containing the brass-coloured pyrites. Silver coins dropped into a hole made in these strata become rapidly reddened, and brass becomes quite black if held over it for a short time.

"Lastly, not only does the heat increase and diminish in various successive layers of the earth, in the neighbourhood of the active springs, but the locality of the heat, as might be expected from their previous observations, travels very considerably in different years.

"The solfatara of Krisuvik, with the mountains about it, is shown in the accompanying sketch by M. Eugène Roberts. It appears from afar to occupy the place of an ancient crater, but, as we have already seen, it is not near the crater, about the centre of the drawing, but at a considerable distance from the old volcanic centre, that the thermal springs and sulphurous exhalations have their present origin.

"Wherever they may have been previously, the springs are now situated between two mountains, the one Badstofer, on the right, originally composed of lava, the other, Vesturhals, on the left, of basaltic formation. Both, by the action of the thermal springs, are undergoing a process of disintegration and reconstruction.

"The kind of hills which form the solfataras, properly so called, increase in extent day by day; by the addition to the disintegrated rock of sulphur and of sulphurous and sulphuric acids.

"The yellow sulphur earth contains about four per cent. of free sulphuric acids; sometimes a little free hydrochloric acid, and a variety of sulphates, as might be supposed. Treated with

distilled water, the filtered solution reddens litmus strongly; on addition of acetate of lead a flocculent precipitate is produced, which, when heated with carbon, disengages sulphurous acid.

"The sulphur is found in many different conditions, but for the most part in the same finely-divided, whitish-yellow form in which it is precipitated from sulphuretted hydrogen solutions. Where it assumes other states, crystallised in tears on the sur-

SOLFATARA OF KRISUVIK. From a Sketch by M. Eugène Roberts.

face of the rocks, or coagulated in veins, it is on account of its having undergone subsequent heating. Of its primary origin by the decomposition of sulphuretted hydrogen, there is in my opinion no doubt.

"Professor Bunsen visited Krisuvik in 1845; his opinion is that sulphurous acid is evolved from the earth's interior, which, oxidised either at the surface by the atmosphere, or at subterranean depths by atmospheric oxygen dissolved in cold water,

is converted into sulphuric acid. The sulphuric acid thus generated is diffused among the constituents of the decomposed beds. This process represents the first stage of the fumerole action, which is manifested in the namar or solfatara of Krisuvik.

"Sulphur is now generally regarded as emanating from the stage of intermittent lethargy of a volcano, and the sulphides of iron, copper, arsenic, zinc, selenium, etc., fall in the same category as sulphur; they are secondary, not primary, formations. In the stage further off we have the host of sulphates produced by the oxidation of the sulphur into sulphuric acid, and its subsequent reaction on the metals and earths with which it becomes associated.

"The description of the Sicilian sulphur beds coincides so very exactly with that of the Icelandic mines, that one might pass very well for the other. D'Aubigny pictures nearly the whole of the central portion of Sicily as being occupied by a vast bed of blue clay or marl, in which are numerous and thick beds of gypsum and sulphur, and a combination of this mineral with iron and copper. The natural process by which they have been formed must, I think, be the same in each case. At Krisuvik copper has been found only in small quantities, but that is probably because it has not been sought for below the surface. Carbonate of copper, associated with sulphate of lime, is of frequent occurrence; and native copper has to a limited extent been discovered.

"A district in America, very similar in most of its characteristics, has recently been explored. The great hot-spring region of the sources of the Yellowstone and Missouri Rivers, in the United States, has, on account of the wonderful natural phenomena there manifested, been set apart by the United States Congress as a great national park for all time.

"The whole of this district is covered with rocks of volcanic origin of comparatively modern date. At present there are no signs of direct volcanic action going on, but the secondary kind of action, resulting probably as at Krisuvik, from the disintegration and decomposition of beds of volcanic origin, is in full progress. Boiling springs, mud-caldrons, and geysers are found in all parts of the region, and the description given by Mr V.

Hayden, of the Yellowstone Lake and its vicinity, in every respect coincides with those of the geysers, mud-caldrons, and hot-springs of Iceland.

"In all cases there was found to be free access of water; free sulphur was widely dispersed, and the steam-jets were invariably accompanied by large quantities of sulphuretted hydrogen. The subterranean action in this country does not appear to have continued long enough to produce beds of sulphur and sulphur-earths, but has, nevertheless, been of sufficiently long standing to build up geyser tubes of so great a length that the internal pressure has formed other vents, rather than lift the immense column of water above it.

"The water of the springs contains sulphuretted hydrogen, lime, soda, alumina, and a slight amount of magnesia; some of these are only occasionally at the boiling point, and these, when the temperature is reduced below 150° Fahr., deposit great quantities of the sesquioxide of iron, which lines the insides of the funnels, and covers the surface of the ground wherever the water flows. If the reaction consists in the decomposition of iron pyrites, and the sulphur is carried sufficiently far off to prevent its re-combination with the iron to form iron sulphate, the formation of the iron sesquioxide is fully accounted for.

"As a rule, the groups of hot springs are, as in Iceland, in the lower valleys, and either along the margins of streams, or nearly on a level with them. The grand area where they occur is within the drainage of the Yellowstone, where a space of forty miles in length, with an average width of fifteen miles, is either at the present time, or has been in the past, occupied by hot springs.

"That the quantity of sulphuric acid here produced is very large, is proved by the immense quantity of alum which is found, for the streams, the mud, the earth are thoroughly impregnated with it. The funnel-shaped craters from which the boiling mud is ejected, are so similar to those of the Krisuvik that the figure on page 140 will answer for both places. The circular rim varies from a few inches to several feet in diameter. Sometimes these are clustered close together, yet each one being separate and distinct from the others.

"The foregoing are the most prominent facts connected with the development of sulphur from the earth in the elementary state. The full explanation of all the phenomena accompanying it appears to me to be the key by which the great secret of volcanic energy may be ultimately unlocked. At present it appears to be doubtful whether the sulphur results from the decomposition of metallic sulphides, by heat and water combined, or by sulphuric acid formed by the oxidation of sulphurous acid. In the one case, the whole action is so far within our reach, that it should not be an insurmountable difficulty to establish the point as to whether the whole action does not depend on the percolation of water into beds of pyrites surrounded by other beds which are non-conductors of heat.

"The other view, viz., that the sulphur proceeds as sulphurous acid from a lower depth, is on account of the more complicated action required, far from being as satisfactory to my mind as the more simple supposition above.

"Until boring experiments have been made, conducted with great care, and to considerable depths, no positive conclusion can be arrived at. It is also an element in the question of much importance, to discover whether the beds penetrated by the water are already heated, whether the water is heated before it reaches the sulphur-bearing strata (the clays containing pyrites), or whether both are not alike cold till they have been for some time in contact.

"Less than a quarter of a mile from the hot springs is a lake, Geslravatn, formed by the filling up of an extinct crater. This the inhabitants describe as being fathomless (Mr Seymour, last year, found no bottom at five and twenty fathoms). The depth is, at any rate, very considerable. Although so close to a spot where the ground is, even at the surface, scorching to the feet, the water in this lake is ice-cold. Sir George Mackenzie also remarked a somewhat similar fact. On the side of the Sulphur Mountain, amidst the seething, steaming hills of almost burning earth, a spring of clear cold water was met with. To my mind these facts are most in accordance with the view that the action is local and self-dependent.

"The Krisuvik sulphur mines have been worked at various

times, but want of proper roads, and ignorance of the proper method of extracting and refining the sulphur, have prevented their proper development. The Sicilian mines can be worked at a considerable profit, where, more than 390 feet below the surface, beds are met with containing only 15 per cent. of sulphur. At Krisuvik, absolutely on the surface, clays are met with which contain from 15 to 90 per cent. of sulphur. Under proper and careful supervision, their future should be prosperous.

"Two German gentlemen, under the auspices of the Danish Government, worked these mines in the early part of the last century, and so much was exported to Copenhagen during the time the excavations were carried on, that a sufficiently large stock was laid up to serve the consumption of Denmark and Norway from 1729 to 1753.

"Horrebow describes the sulphur mines as being actively worked from 1722 to 1728, to the great advantage of the inhabitants, who reaped much profit from its extraction.

"By his account of their mode of prosecuting this enterprise, the sulphur does not appear to have been refined in the island, but exported in its crude state. The less active mines were chosen for cutting into. He says: There is always a layer of barren earth upon the sulphur, which is of several colours, white, yellow, green, red, and blue. When this is removed, the sulphur earth is discovered, and may be taken up with shovels. By digging three feet down, the sulphur is found in proper order. They seldom dig deeper, because the place is generally too hot, and requires too much labour, also because sulphur may be had at an easier rate, and in greater plenty, in the proper places. Fourscore horses may be loaded in an hour's time, each horse carrying 250 lbs. weight. The best veins of sulphur are known by a kind of bank or rising in the ground, which is cracked in the middle. From hence a thick vapour issues, and a greater heat is felt than in any other part. These are the places they choose for digging, and after removing a layer or two of earth, they come to the sulphur, which they find best just under the rising of the ground, when it (the sulphur) looks just like sugar candy. The farther from the middle of the bank, the more it crumbles, at last appearing as mere dust. But the middle of

the bank is an entire hard lump, and is with difficulty broken through. The brimstone, when first taken out, is so hot that it can hardly be handled, but grows cooler by degrees.

"In two or three years these veins are again filled with sulphur. The death of the person at Copenhagen who had the sole and exclusive privilege of exporting sulphur from Iceland put an end to what had promised to be a very thriving industry. The inhabitants continued to collect the sulphur earth for some time after its exportation had ceased; and many of them lost considerably by it, large quantities having been gathered which they were never able to dispose of.

"According to Dr Perkins, the sulphur mines were again worked by the Danish Government for fifteen years, but the method of purifying adopted was very imperfect. The sulphur earth was heated in iron boilers, and when the sulphur was melted, fish oil was added, and the whole mass stirred up. On allowing the mixture to stand for a time, the earthy matter formed a soap on the top of the molten mass; this being removed, tolerably pure sulphur remained behind.

"In 1832, these mines were visited by K. von Nidda, the celebrated geologist, by whose advice a Danish merchant, named Kenidzon, purchased them. He only worked them for a short period. The sulphur earth was collected without much regard being paid to the relative richness of the beds. It was taken on the backs of horses to Havnafiord, and thence shipped to Copenhagen. The cost of transport brought the sulphur to too high a price to render the undertaking successful.

"In 1857, political matters caused the attention of Her Majesty's Government to be directed to finding a new source of sulphur supply. Commander J. E. Commerell, of her Majesty's ship 'Snake,' was sent to Iceland by the Lords Commissioners of the Admiralty, to visit and report upon the capabilities of the mines of Krisuvik and Husavik. He found that the nearest safe port to the Krisuvik beds was Havnafiord; this port is fourteen miles from the sulphur beds by the present roads, and nine miles from Reikjavik. The harbour is well sheltered, with good anchorage of seven or eight fathoms three cables' length from the beach; it at present enjoys as much traffic as Reikjavik. The road from

Krisuvik might be much shortened, and a tramway might also be laid down. During the past year a survey has been made, and plans drawn for a railway or tramway to Havnafiord.

"The actual extent of the sulphur beds it is quite impossible to calculate; forty-seven have been already discovered. The deposit of sulphur Commander Commerell personally saw he describes as amounting to many thousands of tons, and, all the mines being in what is called a 'living' state, the sulphur taken away is reproduced in two or three years. He considers that sulphur in a pure state could be shipped at Havnafiord for £1 per ton.

"The sulphur at Myvatn, though great in quantity, is, he considers, at too great a distance from a port of embarkation to permit its extraction being carried on with any chance of competing with that from the Krisuvik mines.

"No further steps were taken in the matter by the British Government, the political complications which led to the expedition having been removed; but the attention of English merchants having been drawn to these rich deposits by the highly favourable character of Commander Commerell's remarks, renewed attempts are being made to render commercially available the immense sulphur-producing power which the Krisuvik solfataras undoubtedly possess. To some of these gentlemen I am greatly indebted for much valuable information, put at my disposal for the purposes of this paper, and amongst them I have specially to tender my thanks to Mr Ramsdale and Messrs Thorne, of Gracechurch Street, and particularly for the use of numerous and carefully-selected samples of the sulphur earths which were freely placed at my disposal. These samples I hope to make the subject of a future paper.

"Since writing the foregoing paper, I mentioned, in the course of conversation with Sir Henry Holland, the conclusions which are derived from the examination of all the trustworthy facts relating to the sulphur deposits. This led him to examine entries in his unpublished diary, made at Krisuvik in 1810. The theory which he then conceived so thoroughly agrees with all that has been learnt respecting the phenomena in question, that I, with his kind permission, print an extract from his note-book:

"'The theory of these sulphureous springs (if springs they may be termed) at Krisuvik is an interesting object of inquiry. They are situated in a country decidedly of volcanic origin. The high ground on which they appear is composed principally of the conglomerate or volcanic tufa, which has before been noticed. The source of the heat which can generate permanently so enormous a quantity of steam must, doubtless, reside below this rock; whether it be the same which produces the volcanic phenomena may be doubted, at least if the Wernerian theory of volcanoes be admitted. It certainly seems most probable that the appearances depend upon the action of water on vast beds of pyrites. The heat produced by this action is sufficient to raise an additional quantity of water in the form of steam, which makes its way to the surface, and is there emitted through the different clefts in the rocks. The sulphates of lime and alumina, appearing upon the surface, are doubtless produced, in process of time, by these operations. In corroboration of this view, it may be observed that the quantity of steam issuing from the springs at Krisuvik is always greater after a long continuance of wet weather, and that whenever earthquakes occur on this spot, it is during the prevalence of weather of this kind.'

"The learned and now aged author expressed the highest gratification that the views which he formed at twenty-two years of age should possess so much value so many years after."

The visit of the two engineers, Messrs Shields & Gale, has also been elsewhere alluded to. Finally, Mr R. M. Smith informs me that the prospects of the Krísuvík diggings now look brighter. The project of tramways, or locomotives, seems to have been abandoned in favour of carts and ponies plying on a good road, about sixteen miles long, between the Sulphur Mountain and Hafnafjörð.

Section II.—To Hekla, and up It.

The next morning's work began with a path which introduced us to the mud-bog, as opposed to the turf-bog. This pleasant feature led to lava, whose three main torrents and many secondary streamlets could be seen spilling over the trap wall of Lángahlíð. There were the two normal kinds, the soft and cindery, caverned and friable, which makes good paths: it degrades to the dark red and yellow-red humus which is here, as in the Haurán, the general colour of the ground. This variety is clad with two lichens; the grey with black scutella (*L. calcareus?*), and the pure white (*L. Tartareus?*) which makes the ejections of the Safá near Damascus simulate limestone. The other is intensely hard, ruddy black or brown-grey, and in places solid as if poured out yesterday; the reason generally given is the presence of olivine in this trachytic or silicious form. M. Durocher's theory is, that being lighter than the doleritic and augitic (basic), it therefore floats separately, and thus he would explain how lava floods of different composition may proceed from the same locality.[1] The plications of this hard lava, looking as if hogsheads of honey had been poured upon stone, the domes and the drops, not to speak of the sharp-toothed mouths and crevasses, make the traveller suffer for the sufferings of his nag.

At the end of the first great lava-stream was the farm of Herdísarvík; now not a "vík" but a "vatn"—we looked around for sulphur, but in vain. Hard by our right the fierce seas burst and roared upon a coast cruel and harbourless as that of Kafirland; whilst in the smooth distance a few catspaws suggested shoaly islets. The Hlíðarvatn (lithe or slope water) is not like its neighbour a misnomer, but the supply is brackish, ebbing and flowing with the tide, like wells in the valley of the Thames. The only birds seen were wild geese, crees, gulls, curlews, young snipes, and ravens which especially affect this warm part of the

[1] Mr Judd, examining Western Scotland, opines that the felspathic (acid) rocks have been erupted from the Eocene volcanoes, and the augitic (basic) from those of the Miocene age. In Iceland, however, both seem to have been discharged by the Post-tertiary, as well as by the Tertiary epochs.

island. During the halt we especially noticed a number of web-less hunting spiders, whose little nests were full of young —the peasants still preserve the old Köngur-váfa (web-weaver) which the citizens hold obsolete, preferring Könguló or Konguló. There are spider-stories, too, like the Gold Coast "Anansesem;" a small red species, for instance, kills when it bites.

From Litlaland, which we reached whilst the sun was still high, we enjoyed a pleasant view. Beyond the rise of Thorlakshöfn lie the "Irish Islands," tall and picturesque, fronted by the great alluvial plain of south-western Iceland. It has been called Tempe, Arcadia, and Vale of Enna, though utterly unlike the grim defile of Peneus, the stern limestone mounts of the Peloponnesus, and the waterless slopes of Sicily. The "Pastorale in A flat," as Thomas Hood, sen., would have called it, a raw northern facsimile of the Lagos Lagoon, as it appeared to me, gains dignity by the eastern background of eternal snows, the flat top of Eyjafjall, the long ridge of Tindafjall, and the sharp point of Torfajökull. And it is "classic ground." From a commanding site we can prospect Ingolfsfjall, where Iceland's first settler is supposed to be buried, and the Bergthórshvoll farm in the delta of the Markarfljót; behind it lies Hlíðarendi, where the "peerless Gunnar" sleeps in the Tverá Holm.[1]

There is—for Iceland—rare pathos in this description of the hero's tomb.

"They cast a cairn over Gunnar, and made him sit upright in the cairn."

"He sang in the cairn which opened, and he turned himself and looked at the moon, which was shining clear and bright. And men thought they saw four lights burning in the cairn, and none of them cast a shadow. He sang a song, after which the cairn was shut up again."

The next morning led us to Reykir. As we rode up the valley of the Ölfusá we could mark the features of the scene. In front the river was a lake, and the green expanse of the water-veined delta was scattered over with south-facing farms, not acknowledged by Gunnlaugsson and Olsen. Eyrarbakki, so called from

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[1] "He" (Gunnar Hámundarson) "was eulogised by many poets after his death," said an Icelander, with unthinking satire. The last poem is the "Gunnarshólmr," by Jonas Hallgrímsson, a poet who, being loved of the gods, died young.

the host of islets which line the shore, is the only port till Berufjörð on the eastern coast, and it was wholly occupied by two ships. Mr William Hogarth of Aberdeen, who owned the establishment, has not been here, we were told, for years; lately, however, some English visitors had excellent fishing in the river, and were hospitably entertained by Hr Thorgrimsson, agent to M. Lefolii, a Danish merchant. All this greenery was set off by the barrenness of the buttressed Lángahlíð hard on our left. The regular horizon of trap-wall had been succeeded by a sharp slope of Palagonite conglomerate, which evidently underlies the whole

THE RURAL SCENE.

block. On the summit is a desert where no man dwells, broken by pyramids which are evidently lava-cones, Skálafell (scald or bald hill ?) being the chief feature; upon the lips of the plateau are gushes of modern lava, and on the low levels appears an ancient sea-beach, scattered with rounded blocks like giant rocs' eggs.

"Hjalli," which we reached about noon, was somewhat peculiar

—instead of being a single farm, four establishments clustered round the black chapel. It had its rivulet where the girls comb their yellow hair o' mornings; the Lavapés (wash-feet) of the Brazilian country town; it had also its Paradís, a poetical name for the grassy combe, where men bask i' the sun. The males were clad in pastoral attire, the old native dress deemed somewhat too *marqué* for town and comptoir. The chief items are a shirt, a waistcoat, and a tight, very tight, flannel culotte, braccæ gartered below the knee and ending in stockings and Iceland shoes. The stranger's first impression is that harlequin, without his spangles, has forgotten his overalls. This primitive toilette of the non-Roman races,[1] which gave birth to our civilised attire, still lingers in parts of Europe, notably in the Cicería of Istria, where the charcoal-burners (Cici) will adopt no other costume. And what can be more ridiculous than the Hungarian foot-soldier wearing his drawers, when we know the wide Turkish Shalwar to be his national terminations?

"Reykir!"[2] ejaculated Páll, pointing triumphantly to a little yellow splotch on the far side of the broad valley. As we progressed towards the Reeks, we found the forage improving, and the soil becoming damper; this is commonly the case, because the western frontage enjoys the most sun. Of five springs clustered upon either bank of the little Varmá, the largest lies on the left, where Palagonite breccia forms the base of a ruddy spine, projected by the northern outliers of the Ingolfsfjall *massif*. The usual motley colours of a solfatara are set off by a more brilliant green than usual, and by a silver-tinted moss (*Trichostomum canescens*), which makes the turf-carpet feel soft as velvet.

Reykir is known as the Litlé Geysir, or "the Geysir in Ölfus." In 1770 Uno Von Troil declared that it used to rise sixty to seventy perpendicular feet, in fact, as high as the Great Geysir of 1872, but that an earthquake, after cutting off a few feet (fifty-four to sixty), made it spout sideways. Nothing can be

[1] The Romans were naked below the knee: the pillars of Trajan and Antonine show Teutonic captives wearing a dress much resembling that of our peasants and sailors.

[2] Often written Reykium (for Reykjum), dative plural of second declension. As has been seen, the word enters into a multitude of Icelandic proper names.

meaner than the modern display, and my companion compared it disadvantageously with that "furious fountain" of the guide-books, the Sprudel of Carlsbad. The chief well to the north has built for itself a party-coloured mound like a nest of African termites, and puffs only vapour with the sumph of a donkey-engine. A hundred yards or so to the south is a younger spring with double boilers, in which the water may rise at times a foot and a half high: the "hell broth" slithers through a soft and soppy circle, down a foul channel of burnt pyrites and silica-clothed trap to the bubbling Varmá. This stream shows from a height, three branches draining from the north-west, where are other sulphur springs.

A whole generation of travellers has complained of the farmer of Reykir, who is said to have charged one man $52 per diem. We can only speak of him as we found him; his demand for forage was extremely moderate, and we attributed the fact to having an honest and thrifty guide.

A swampy ride in the afternoon led to the ferry of the Ölfusá or lower Hvitá. The ground was spangled with Fífa or cotton grass (*Eriophorum*), a weed with a bad name. It is more common here than in the southern islands, Scotland, and Germany, and it is supposed to haunt the worst and most dangerous bogs, where water sinks instead of flowing. "Avoid cotton grass ground" is the advice of every traveller: unfortunately you cannot, and you must make the best of it. But why call it the "treacherous cotton grass," when it at once tells you the worst? On the other hand, buck-bean (Hor-blaka, or *Menyanthes trifoliata*) is praised because it shows the surface to be safe.

After three hours we reached the ferry, a busy scene for Iceland. Caravans charged with imported boards and fish to be exported, lay unloaded on either bank. Amongst the travellers was the Bishop of Iceland with a party of six; he had ridden from Reykjavik to Reykir in nine hours, and as he sat water-proof'd in the sun, he complained sadly of fatigue. A couple of two-oared boats, big and small, with a third high and dry, did not tend to expedite transit—nothing would be easier than to establish a wire rope and a ferry with lee-boards, thus making the current do all the work.

Rain threatened, and we lodged, as Abyssinians might lodge, in the church of Laugadælir, after duly admiring the farmer's *chef d'œuvre*, a brass chandelier. All was very grotesque; the Psalms were chalked up on the wall, a Mambrino's helmet acted font, and the altar-piece showed bow-legged Mattheus, with Marcus, Lucus, and Johannes to match. Around the fane lay the churchyard, where the peasant

> "lies at peace with all his humble race,
> And has no stone to mark his burial-place."

It was the usual reverse of gardenesque or picturesque. Sheep grazed upon the weeds that "had no business there," and the railings were utilised for drying socks and small-clothes.

The fourth march proved peculiarly unpleasant. When the weather is bad at Reykjavik, here it is detestable. The display of water-works seemed the effort of the old Polynesian giants, who submerged the greater part of earth—Terrible-rain, Long-continued-rain, Fierce-hailstorm, and their progeny, Mist, Heavy-dew, and Light-dew. In plain English it was a "jolly wet day." The horses very sensibly bolted up stream, and refused to be caught till noon, when the men returned dripping as loons or roaches. The delta of the two great streams is said to be, in fine weather, one of the fairest pastoral scenes the island can show; but we saw it at its worst, sadly deformed, and we gathered practical experience of what a few hours of downfall can do in this semi-saturated region. The paths were "dead," or rather, they were shown only by lines of puddle; the sloughs and quagmires admitted our ponies to the hocks; the drains overflowed like little hill-races, and the labour of rounding the deeper fens was immense. A few peaks which lay but a little distance to the north seemed immeasurably removed, like

> "Far-off mountains turnèd into clouds."

About mid-afternoon we came upon the Thjórsá, "fluviorum rex Eridanus" of Iceland: even at this upper part it looked like an estuary, split by sandbars, piles of basalt, sandbars and basalt again. We pushed hard over the few good places; and moist, mouldy, and malcontent, we were right glad to find ourselves in the strangers' room of the ferryman's house: 20 feet long by 14

broad and 7 high: dated 1848, it was an *omnium gatherum* of the family goods, and it boasted of one four-paned window, which has never opened, and which never will. The features denoting wealth were huge wooden lockers, like seamen's chests, of bright colours, painted with flowers and arabesques of still brighter tints: I could not but remember the pea-green and gamboge box which carried to Meccah the drugs of a certain "Haji Abdullah." The soiree ended with a distressing banality. Fair visions of girls who kiss the stranger on the mouth, who relieve him of his terminal garments, and who place a brandy bottle under his pillow, and a bowl of milk or cream by his side, where are ye? Icelanders have allowed their pleasant primitive fashions to be laughed away by the jeering stranger, who little thought how much the custom told in favour of the hosts. The *naïve* modesty of antiquity, when Nestor's youngest daughter laved, anointed, and dressed Telemachus, and when the maids of Penelope had a less pleasant task with the elderly Ulysses, has departed with the public bathings, in angelic attire, of Iceland, of Sind, and of Japan, and the kiss given to the guest by the young wife or the eldest daughter of the Morlacchi house. This *sublime impudeur* was possible only amongst a pure race: the sneers of a single civilised savage suffice to demolish this "*heureuse absence du 'schoking.'*"

Next morning, while the horses were grazing, we ascertained that the farm had its therma: a jet of steam issuing from the ground near the river had been turfed over, with room to stand; and thus a Turkish, or rather a Russian, bath was possible on bath-day. We then walked down to the Thjórsá, an especially grisly spectacle. Its breadth, 250 yards, was occupied by white glacier water, with a sulphury tinge, rendered more ghastly by the black sand, rocks, and islets studding the bed above and below the ferry. The right bank showed a wall of conglomerate, and on both sides "cachoeiras" dashing over the stones gave pleasant reminiscences of San Francisco. The left bank is of Hekla lava, either compact or very porous containing crystals of lime. We found a natural hatchet and quantities of pumice, many-coloured, but mostly yellow: it floats in water, and it is useful for holystoning the skin. The velocity was three knots, and the

temperature 52° (F.). The ferry creeps up from the stone-head acting pier on the right bank, swings across below the break, and lands you in water on the far side.

The conduct of ponies at the ferry is always amusing. They are driven in by the shouts of lads and lasses, by tossings and wavings of the arms, by sticks and stones, and by the barking and biting of curs. They sidle, jostle, step in daintily, smell the water, and, after trembling on the brink for a time, some plucky little nag takes the lead. He is followed by the ruck, but there are often cowards ready to hark back: these must be forced on with renewal of stick and stone, and by driving those that have crossed up and down the bank. In dangerous narrow beds, it is often necessary to tow over shirkers one by one with a rope. The swimmers gallantly breast the flood, which breaks upon their crests; and they paddle with heads always up stream, dilated eyes and nostrils snorting like young hippopotami; the best always carry the back high. As they reach the far end, they wade slowly to shore, and fall at once to grazing. They took four minutes thirty seconds to cross the Thjórsá, and as usual they were drifted far down.

We then pricked fast over the little pampa which lies between the Thjórsá and the Hekla-foot, making, I know not why, for Stóruvellir. Here we were received by Síra Guðmundr Jónsson, a gentlemanly man, who has accompanied several travellers, notably the "Oxonian," up the volcano; he showed the Iceland peculiarity of "walking the quarter-deck;" and his handsome blue-eyed daughter wore the sternest of looks, apparently engendered by semi-solitude. He indulged in wild archery about the dangers of the climb, which, over biscuits and coffee, sounded truly awful. After leaving the parsonage, we enjoyed our first fair view of Hekla: during the earlier ride it had been buried in clouds, and hidden by the chapel block, Skarðfjall.

The Hekla of our ingenuous childhood, when we believed in the "Seven Wonders of the World," was a mighty cone, a "pillar of heaven," upon whose dreadful summit white, black, and sanguine red lay in streaks and patches, with volumes of sooty smoke and lurid flames, and a pitchy sky. The whole was somewhat like the impossible illustrations of Vesuvian eruptions, in

body-colours, plus the ice proper to Iceland. The Hekla of reality, No. 5 in the island scale,[1] is a commonplace heap, half the height of Hermon, and a mere pigmy compared with the Andine peaks, rising detached from the plains; about three and a half miles in circumference, backed by the snows of Tindafjall and Torfajökull, and supporting a sky-line that varies greatly with the angle under which it is seen. Travellers usually make it a three-horned Parnassus, with the central knob highest—which is not really the case. From the south-west, it shows now four, then five, distinct points; the north-western lip of the northern crater, which hides the true apex; the south-western lip of the same; the north-eastern lip of the southern crater, which appears the culminating point, and the two eastern edges of the southern bowls. A pair of white patches represents the "eternal snows." On the right of the picture is the steep, but utterly unimportant, Thríhyrningr, crowned with its bench-mark; to the left, the Skarðsfjall, variegated green and black; and in the centre, the Bjólfell, a western buttress of the main building, which becomes alternately a saddleback, a dorsum, and an elephant's head, trunk, and shoulders.

We came upon the valley of the Western Rángá[2] at a rough point, a gash in the hard yellow turf-clad clay, dotted with rough lava blocks, and with masses of conglomerate, hollowed, turned, and polished by water: the shape was a succession of S, and the left side was the more tormented. Above the ford a dwarf cascade had been formed by the lava of '45, which caused the waters to boil, and below the ford jumped a second, where the stream forks. We then entered an Iceland "forest," at least four feet high; the "chapparal" was composed of red willow (*Salix purpurea*), of Grá-viðir, woolly-leaved willow

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[1] The four higher are (S.E.) Öræfajökull (6426 English feet); (W.) Snæfell (5964); Eyjafjallajökull (5593) to south, and Herðubreið (5447) to north-east. Stanley (repeated by Dillon) assigned to Hekla 4300; Sir J. Banks, with a Ramsden's Barometer, 5000. Gunnlaugsson gives 5108, but here he is very defective, wanting a separate and enlarged plan. The direct distance from the summit to the sea is usually laid down at thirty miles; measured upon the map, the "bee-line" would be twenty-seven geographical miles.

[2] Rángá ("wrong" or crooked stream) is a name that frequently occurs, and generally denotes either that the trend is opposed to the general water-shed, or that an angle has been formed in the bed by earthquakes or eruptions.

(*Salix lapponum*),[1] the "tree under which the Devil flayed the goats"—a diabolical difficulty, when the bush is a foot high—and the awful and venerable birch,[2] "la demoiselle des fôrets," which has so often "blushed with patrician blood." About mid-afternoon we reached Næfrholt (birch-bark hill),[3] the "fashionable" place for the ascent, and we at once inquired for the guide. Upon the *carpe diem* principle, he had gone to Reykjavik with the view of drinking his late gains; but we had time to organise another, and even alpenstocks with rings and spikes are to be found at the farm-house. Everything was painfully tourist.

In the evening we scaled the stiff slope of earth and Palagonite which lies behind, or east of, Næfrholt: this crupper of Bjólfell, the Elephant Mountain, gives perhaps harder work than any part of Hekla on the normal line of ascent. From the summit we looked down upon a dwarf basin, with a lakelet of fresh water, which had a slightly (carbonic) acid taste, and which must have contained lime, as we found two kinds of shells, both uncommonly thin and fragile. Three species of weeds floated off the clean sandstrips. Walking northwards to a deserted byre, we found the drain gushing under ground from sand and rock, forming a distinct river-valley, and eventually feeding the Western Rángá. This "Vatn" is not in the map; though far from certain that it is not mentioned by Mackenzie, we named it the "Unknown Lake." Before night fell we received a message that three English girls and their party proposed to join us. This was a "scare," but happily the Miss Hopes proved plucky as they were young and pretty, and we rejoiced in offering this pleasant affront of the feminine foot to that grim old *solitaire*, Father Hekla.

Before the sleep necessary to prepare for the next day's work, I will offer a few words concerning the "Etna of the

[1] The down is applied as a styptic to cuts, the leaves are used in tanning, and the wood makes ink.

[2] Klaproth remarks that this is the only tree (? the poplar = Pippal) which the Aryan colonists of Europe remarked, and distinguished by the Sanskrit name. Thus Bhurrja became the Latin Betula, the Gothic Birkun, the Scandinavian Birki and Björk, the German Birke, and the English Birch. The name is applied under the form of Bjarkar to the thirteenth Runic letter = B or P; and it is the first Irish letter, Beith.

[3] Næfr, or birch-bark, was used for thatching: Næfra-maðr, the birch-bark man, was an outlaw (Cleasby).

North," sparing the reader, however, the mortification of a regular history. It was apparently harmless, possibly dormant, till A.D. 1104, when Sæmund, the "Paris clerk," then forty-eight years old, threw in a casket, and awoke the sleeping lion. Since that time fourteen regular eruptions, without including partial outbreaks, are recorded, giving an average of about two per century. The last was in 1845. The air at Reykjavik was flavoured, it is said, like a gun that wants washing; and the sounds of a distant battle were conducted by the lava and basaltic ground. The ashes extended to Scotland. When some writers tell us that on this occasion Hekla lost 500 feet in height, "so much of the summit having been blown away by the explosions," they forget or ignore the fact that the new crater opened laterally, and low down.

Like Etna, Vesuvius, and especially Stromboli, Hekla became mythical in Middle-Age Europe, and gained wide repute as one of the gates of "Hel-viti." Witches' Sabbaths were held there. The spirits of the wicked, driven by those grotesque demons of Father Pinamonti which would make the fortune of a Zoological Society, were seen trooping into the infernal crater; and such facts as these do not readily slip off the mind of man. The Danes still say, "Begone to Heckenfjæld!" the North Germans, "Go to Hackelberg!" and the Scotch consign you to "John Hacklebirnie's house." Even Goldsmith (Animated Nature, i. 48) had heard of the local creed, "The inhabitants of Iceland believe the bellowings of Hecla are nothing else but the cries of the damned, and that its eruptions are contrived to increase their tortures." Uno Von Troil (Letter I.), who in 1770, together with those "inclyti Brittanici," *Baron* Bank and Dr Solander, "gained the pleasure of being the first who ever reached the summit of this celebrated volcano," attributes the mountain's virginity to the superstitions of the people. He writes soberly about its marvels; and he explains its high fame by its position, skirting the watery way to and from Greenland and North America. His companions show less modesty of imagination. We may concede that an unknown ascent "required great circumspection;" and that in a high wind ascensionists were obliged to lie down. But how explain the "dread of being blown into the most dreadful

precipices," when the latter do not exist? Moreover, we learn that to "accomplish this undertaking" they had to travel from 300 to 360 miles over uninterrupted bursts of lava, which is more than the maximum length of the island, from north-east to south-west. As will be seen, modern travellers have followed suit passing well.

The next morning (July 13) broke fair and calm, reminding me

"Del bel paese la dove il sì suona."

The Miss Hopes were punctual to a minute—an excellent thing in travelling womanhood. We rode up half-way somewhat surprised to find so few parasitic craters; the only signs of independent eruption on the western flank were the Rauðhólar (red hills), as the people call their lava hornitos and spiracles, which are little bigger than the bottle-house cones of Leith.

At an impassable divide we left our poor nags to pass the dreary time, without water or forage, and we followed the improvised guide, who caused not a little amusement. His general port was that of a bear that has lost its ragged staff—I took away his alpenstock for one of the girls—and he was plantigrade rather than cremnobatic: he had stripped to his underalls, which were very short, whilst his stockings were very long, and the heraldic gloves converted his hands to paws. The two little snow fonds ("steep glassy slopes of hard snow") were the easiest of walking. We had nerved ourselves to

"Break neck or limbs, be maimed or boiled alive,"

but we looked in vain for the "concealed abysses," for the "crevasses to be crossed," and for places where "a slip would be to roll to destruction." We did not sight the "lava wall, a capital protection against giddiness." The snow was anything but slippery; the surface was scattered with dust, and it bristled with a forest of dwarf earth-pillars, where blown volcanic sand preserved the ice. After a slow hour and a half we reached the crater of '45, which opened at nine A.M. on September 2, and discharged lava till the end of November. It might be passed unobserved by an unexperienced man. The only remnant is the upper lip prolonged to the right; the dimensions may have been

120 by 150 yards, and the cleft shows a projecting ice-ledge ready to fall. The feature is well marked by the new lava-field of which it is the source: the bristly "stone-river" is already degrading to superficial dust. A little beyond this bowl the ground smokes, discharging snow-steam made visible by the cold air. Hence doubtless those sententious old travellers "experienced, at one and the same time, a high degree of heat and cold."

Fifteen minutes more led us to the First or Southern Crater, whose Ol-bogi (elbow or rim) is one of the horns conspicuous from below. It is a regular formation about 100 yards at the bottom each way, with the right (east) side red and cindery, and the left yellow and sulphury; mosses and a few flowerets grow on the lips; in the sole rise jets of steam, and a rock-rib bisects it diagonally from north-east to south-west. We thought the former the highest point of the volcano, but the aneroid corrected our mistake.

From First Crater we walked over the left or western dorsum, over which one could drive a coach, and we congratulated one another upon the exploit. Former travellers, "balancing themselves like rope dancers, succeeded in passing along the ridge of slags which was so narrow that there was scarcely room for their feet," the breadth being "not more than two feet, having a precipice on each side several hundred feet of depth." Charity suggests that the feature has altered, but there was no eruption between 1766 and 1845; moreover, the lip would have diminished, not increased. And one of the most modern visitors repeats the "very narrow ridge," with the classical but incorrect adjuncts of "Scylla here, Charybdis there." Scylla (say the crater slope) is disposed at an angle of 30°, and Mr Chapman coolly walked down this "vast" little hollow. I descended Charybdis (the outer counterscarp) far enough to make sure that it is equally easy.

Passing the "carriage road" (our own name), we crossed a *névé* without any necessity for digging foot-holes. It lies where sulphur is notably absent. The hot patches which account for the freedom from snow, even so high above the congelation-line, are scattered about the summit: in other parts the thermometer, placed in an 18-inch hole, made earth colder than air. After a short climb we reached the apex; the ruddy-walled

north-eastern lip of the Red Crater (No. 2): its lower or western rim forms two of the five summits seen from the prairie, and hides the highest point. We thus ascertained that Hekla is a linear volcano of two mouths, or three including that of '45, and that it wants a true apical crater. But how reconcile the accounts of travellers? Pliny Miles found one cone and three craters; Madame Ida Pfeiffer, like Metcalfe, three cones and no crater.

On the summit the guides sang a song of triumph, whilst we drank to the health of our charming companions and, despite the cold wind which eventually drove us down, carefully studied the extensive view. The glorious day was out of character with a scene *niente che montagne*, as the unhappy Venetian described the Morea; rain and sleet and blinding snow would better have suited the picture, but happily they were conspicuous by their absence. Inland, beyond a steep snow-bed unpleasantly crevassed, lay a grim photograph all black and white; Lángjökull looking down upon us with a grand and freezing stare; the Hrafntinnu Valley marked by a dwarf cone, and beyond where streams head, the gloomy regions stretching to the Sprengisandur, dreary wastes of utter sterility, howling deserts of dark ashes, wholly lacking water and vegetable life, and wanting the gleam and the glow which light up the Arabian wild. Skaptár and Öræfa were hidden from sight. Seawards, ranging from west to south, the view, by contrast, was a picture of amenity and civilisation. Beyond castellated Hljóðfell and conical Skjaldbreið appeared the familiar forms of Esja, and the long lava projection of the Gold Breast country, melting into the western main. Nearer stretched the fair lowlands, once a broad deep bay, now traversed by the network of Ölfusá, Thjórsá, and the Markarfljót; while the sixfold bunch of the Westman Islands, mere stone lumps upon a blue ground, seemingly floating far below the raised horizon, lay crowned by summer sea. Eastward we distinctly traced the Fiskivötn.[1]

[1] Mr Pliny Miles distinctly denies the existence of these fish-lakes, which Metcalfe observed, and which we clearly saw. There is a Fisksvatnsvegr, which has been travelled over, and there are reports of a volcano having burst out there about a century ago.

Run the eye along the southern shore, and again the scene shifts. Below the red hornitos of the slope rises the classical Three-horned, not lofty, but remarkable for its trident top; Tindfjall (tooth-fell) with its two horns, or pyramids of ice, casting blue shadows upon the untrodden snow; and the whole mighty mass known as the Eastern Jökull, Eyjafjall (island-fell), so called from the black button of rock which crowns the long white dorsum; Kátlá (Kötlu-gjá), Merkrjökull, and Goðalands, all connected by ridges, and apparently neither lofty nor impracticable.[1] I venture to predict that they will succumb to the first well organised attack.

The descent, in three hours, was as fast as the ascent had been slow. We soon saw the last of our fair companions who, mounted and attended by their train, rode gallantly back to Stóruvellir. Amongst the party was Síra Guðmundr's son, a sharp youth of eighteen, and if there was not something under his waistcoat buttons which was beating at an accelerated pace, I am much mistaken. We felt demoralised by this unusual dissipation; we cooled our blood with Skyr; we bathed in the Lavapés, and we tried throwing a line, but came back with a hook behind, as the people say.

The reader will probably determine that this account of Hekla is a trifle hypercritical. But after a single day spent upon the volcano, which has so often been ascended, what can man find to explore except the labours of his predecessors? Nor would it be fair to leave unnoticed this excellent specimen of exaggerated writing upon the subject of Thule, which perhaps culminates on Hekla.

Section III.—To Geysir, and at It.

I would willingly have spent another day on Hekla, but the seething hot morning (82° F., at nine A.M.) had animated the flies with a more than normal "cussedness." The scene was

[1] The highest apparent point shown to us on the south-east was Grænafjall. Upon the map it is an insignificant north-eastern "mull" of the Tindafjalla-jökull, but refraction had added many a cubit to its low stature.

unusually "Arcadian." Betimes the dogs folded the ewes with loud barkings, re-echoed by the backing ridge; and mother and daughters went to milk them, the "help" carrying a pair of pails fended by a square hoop. Meanwhile the lads drove the cows towards the womankind, and accompanied the horses to pasture. Even the hyæna-striped cats, bastard tortoise-shells, crept towards the fields, as if intent on grasshopper-hunting. About the house hung only the mankind, too dignified for labour; and the grandmother here is, like the grandfather, an institution; the bearded, mustachioed "old soldier," with huge fez and hair cut boy-fashion, wanted to "swop" with us for spirits: all the males, middle-aged or old—the latter *plutôt vieillis que vieux*—appeared cut in the same pattern. Their necks were swathed as if lately recovering from diphtheria; their coarse heavy limbs were displayed by the flannel "tights;" their unshaven faces with loose lips, open mouths, and noses embrowned by preeing the sneeshing-mull, looked stolid enough when blear-eyed; when not so the hard optics had a cunning rat-like expression, showing that abundant *selbstgefühl* and a strong brain lie behind that unpromising mask. Such in some points was, in days we have read of, the rude Carinthian boor, now most polished of peasants.

This day's march, between Hekla and the Geysir, is one of the most unpleasant in civilised Iceland. Travellers going eastward complain of it, and we found it worse for horse and rider, as the progress was from good to bad. A clerical friend subsequently divided the *iter* into three: between Næfrholt and the Thjórsá it was "bonum," "mediocre" from the river to Hruni, and thence to the end "malum"—"pessimum." As it is Sunday, the ferry lacks ferryman, and delays us for some time. The peasants are all *endimanchés*, and they stare at the stranger, expecting him to bow first. The Brazilian Caipira bends to the best mule, the Styrian to the black coat, but these men have no standard, and a rough nod is the extent of their recognition. They remind me much of what was said about the Siebenburgers of Transylvania: "The people are shrewd and intelligent, and, thanks to the national custom, they possess a fair amount of knowledge. But the peasant's demeanour imposes at

first, and all would be *adelig*. After this it rather tells against him than otherwise, for when you come to measure him, you involuntarily do so by a higher scale than you would apply to another in his position of life. Then, if you find discrepancies, you are apt to judge him over severely, but this is partly his own fault, for it was solely his air and manner which caused you to apply the standard you have chosen." On the other hand, the unpromising figure that rides by with a glare in Iceland may be a man of substance, possibly even a vestryman.

We saw Hekla more than once on both sides of the Thjórsá, and now, aided by experience, we could explain the varying of the apices. About mid-afternoon we came upon the Laxá, for which Páll condescended to make certain preparations. An old man mumbled some directions about the ford, but they were utterly unintelligible. A mark persuaded a barefooted woman to leave the house: after spitting, as did the gentlemen of Beaux before they drank, she led the way, knitting and talking at least a quarter of an hour, to impress upon us the necessity of making for *that* rock. Crossing the broad bed was quite easy, and the view was unusually picturesque. The goodly stream was girt on both sides by spoil banks of red and white earth, suggesting hot springs; there were green side-gorges ready for homesteads, and the upper part was a rugged brown ravine, somewhat like what may be seen on the higher Arno.

After fording we rode up to the Sólheimar farm, a large and comfortable establishment; its approach was the usual avenue which wants ditches and drains instead of turf walls. The churlish owner detained us till the horses were strung together and sent, under the charge of his son, outside the "tún." He gave us some skimmed milk, and we paid him half-a-mark. The idea of a gentleman farmer, or even humble Giles, taking twopence for a glass of small beer!

We sat, after reaching Hruni, amongst the graves, which had just been utilised by mowing. Seeing our forlorn plight, the Prófastr, Síra Johann Brím or Briem, came out of his house, kindly greeted us in Latin, and did the honours of his little church. On the right of the entrance was the small library, containing the oldest Icelandic translation of the New Testa-

ment [1]—not bad *pro pauperie nostrâ*. Better still, he led us to his home and, enlarging upon the *mal paso* before us, he adhibited a most copious feed of Hvítá salmon, smoked beef, cheese, biscuits, and white bread, with golden sherry and sundry cups of *café au lait*. And as we mounted with many *vales* and *gratias agimus*, he insisted upon a final Hesta-skál (stirrup-cup) of distilled waters. I afterwards learned that we were not the only travellers whom the good Prófastr has sent on their way rejoicing: he extends a similar hospitality to all strangers.

Mightily refreshed, we looked forward with pleasure to the novelty of a really vile Iceland path, and to fording a river with a notably bad name. The line was certainly foul, a succession of ugly swamps: in this part of the island the meridional routes are good, not so those running east to west, and striking the streams at right angles. The Hvítá proved itself a barking dog; the muddy white water, like the discharge of a gutter, was split into six veins, and swashed round the sand-holms, bright with the island-rose. The worst were Nos. 1, 4, and 6, the latter nearest the right bank. Páll's nag came to grief over a round stone, but he cleverly dismounted; and our stout little animals, now waxing sadly tired, mustered courage to spring goat-like up the steep side. In the Morea this Hvítá would be called Gaidar-opnictis, or the donkey-drowner.

We travelled along the right-hand valley of the White Water, which here assumes a menacing, sinister aspect, and the frequent ferries, above and below the ford, prove that it can be really dangerous: when the spring-snows melt, the scene must be imposing. The current, like that of the Congo, boils and swirls through a deep gorge, a trough of perpendicular rocks which wholly ignore landing-places. A number of "old men" showed the desolation of the land, all gorges and dykes, and the sheep followed us, as young bisons do, for company's sake. We remarked, for the first time, that the sun really set, and that in Iceland there is such a thing as a moon: this simulation of night without a dawn before one A.M. was comforting. Still in the brassy northern sky rose the weird forms of the Jarlhettur,

[1] Alluded to in Chap. VI.

the earl's hats—and we wearily wondered who the hatter might have been. A tower and a rampart, jagged into a saw, form a castellated wall defending the south-eastern glacis of Láng-jökull. About ten P.M. we fell into a long descent, clothed with birch forest, and we idly discussed how long it would take a rhinoceros to graze it down. Mr Bryson could not trace any birch or bush nearer than thirty miles from the Geysir: he might have found them within five miles to the west and seven to the east. A big column of white vapour on our right, and others scattered over the distance, again and again deluded us, and we neglected the real thing, two humble puffs, to the left or west.

A short colloquy at a farm-house made Páll sure of his direction, and he hurried us on to the goal through villainous bog and splashing streams. Disappointment at once awaited us. A large party of travellers had, we heard, pitched tents at the water-works, stubbornly resolved to wait an explosion. The hay, the firewood, the broken bottles, the scraps of newspaper, and the names fresh-graved upon the sintery saucer told their own tale: the Gusher had gushed, we afterwards learned, on the 13th, and might not gush again for a fortnight. In melancholy mood we pitched the "pal," open towards the basin, and under the shadow as it were of the steam, which we could hear, see, feel, touch, and smell. The guide went off to sleep at Hauka-dalr (hawk dale), a farm dimly looming to the north; but the traveller is, to speak figuratively, tied by the leg, chained to the Geysir. Unless Fate favour him with a display, he can neither visit the home of Ari Fróði nor St Martin's baths, whose miraculous cures of the lame and the leper have ceased with the child-like, trusting faith that caused them.

Once or twice during the remnant of the night we heard a growl, when

> "Fell Geyser roared and struggling shook the ground."

Each time the rumble and the crepitus caused a rush from the tent, but beyond the pleasing mobility of the vapour-clouds there was nothing to see. The cold morning air showed the puffs and sheets of steam rising from the Geysir-ground to great advantage.

St Swithin's Day "in the morrnin'," began with a visit from Páll, who brought an old woman to make coffee at the boiling spring, and Haukadalr cream which savoured strongly of civilising influences—Hr Sigurðr Pállsson's family has evidently learnt "a thing or two." Came also the spade *de rigeur*, which a generation has used for worrying the Strokkr; it lets for $1 per diem, and by this time it must have proved itself a small silver mine.

The day broke cold and cloudy, with a wind from north and north-west, and the air was not swept clean till the afternoon, when a strong north-wester set in. We found to the west of the Geysir a bath, lately made with turf and stone; its unconscionable heat drove us farther south. An excellent therma might easily be cut in the silex; and as for warm and cold water, they can be turned on *ad libitum*. The element has a slimy feel, the effect of silica (?), which reminded me of Central African frog-pools; it has no appreciable taste nor sediment, yet clothes washed in it are tainted with sulphur; and we can swear that it tinges "Schnapps" with a rich horsepond hue.

After the holystoning required for comfort, we proceeded to the serious study of the emplacement. It has been perfunctorily described by all travellers, even by Baring-Gould, and worse by the venerable Lyell. The latter makes "the Geysers" rise through lava which may have been erupted by Hekla, distant only thirty miles, which is impossible.

The site has been compared with the Vale of Siddim (the gushers?), where a certain "sad catastrophe" took place, and where general volcanic action exists only in the brain of M. de Saulcy. Nothing can be more unlike. These pocket "Campi Phlegræi" cover a few square yards, a patch probably overlying pyrites, upon the left or western plain, which gently slopes towards the Túngufljót. The "Tongue"[1] or Mesopotamian "flood" winds snake-like through the moorland of dull-yellow clay, rhubarb-coloured humus, and bog, alternating with green vegetation: here it is hid by high banks; there it shows its vertebræ in streaks and dots of silvery stream, flashing in the sun. Houses and farms unknown to the map vary the surface. The readily-

[1] Tunga is applied to the Doab of two rivers; Tangi is a land-spit, a point projecting into the sea or river.

flooded river-valley, of old a sea-arm, trends with almost imperceptible fall from north-north-east to south-south-west; and at this point it may be nine miles wide: in the former direction it drains the Haukadalsheiði, and ultimately the Lángjökull. Up stream the eye ranges from the azure saddleback of Bláfell, an extinct volcano, they say, to the lumpy cones and denticulated crests, rocky and snowy, known as the Hrútafell, the Hrefnubúðir, the Brekkja, and the Hreppfjall. Down stream the glance rests upon a number of little mounds dotting the various alluvial Doabs of the ancient Fjörð, especially the Hestfjall, backed by the taller Örðufell, lying south-east of Skálholt. The eastern bank is a regular line of rolling hill, separating the main artery from the Hvítá, the snow-streaked peaks of Gelldingafell: the Berghyllsfjall, and the coffin-shaped Miðfell are the principal eminences. The western flank is formed by the major range of the Laugarfjall, which is not named in the map; this line is backed by the Bjarnarfell, the Sandfell, and the lava-stream known as Uthliðshraun.

But the intricacy of the site, a valley within a valley, is not yet ended. On the west of the Túngufljót there are still two influents, badly shown in the map, which form a watershed of their own, flowing down troughs which often obscure them from sight, parallel with and eventually feeding their main stream. This secondary feature is bounded eastward by a dwarf divide, a shallow arch of ground, and westward by the Laugarfjall, an insulated node of degraded phonolite and heat-altered trachyte, which has been driven through the Palagonite.[1] This rock islet, a few hundred feet high, with its two green knobs, is divided by a stony precipice, and by a low, marshy, stream-cut valley from the western range (Laugarfjall), of which it is an outlier; and it curves with its concavity open to the rising sun.

On the eastern slope of the trachytic pile and extending round the north of the rock-wall are the Hvers and Geysirs. Nothing can be meaner than their appearance, especially to the tourist who travels as usual from Reykjavik; nothing more ridiculous than the contrast of this pin's point, this atom of pyritic forma-

[1] This is the "low trap hill" of former travellers, supposed to be one of the veins that pierced the elevated diagonal.

tion, with the gigantic theory which it was held to prove, earth's central fire, the now obsolete dream of classical philosophers and "celebrated academicians;"[1] nothing more curious than the contrast between Nature and Art, between what we see in life and what we find in travellers' illustrations. Sir John Stanley, perpetuated by Henderson, first gave consistence to popular idea of "that most wonderful fountain the Great Geysir:" such is the character given to it by the late Sir Henry Holland, a traveller who belonged to the "wunderbar" epoch of English travel, still prevalent in Germany. From them we derive the vast background of black mountain, the single white shaft of fifty feet high, domed like the popular pine-tree of Vesuvian smoke, the bouquet of water, the Prince of Wales feathers, double-plumed and triple-plumed, charged with stones; and the minor jets and side squirts of the foregrounds, where pigmies stand and extend the arm of illustration, and the hand of marvel.

In this little patch, however, we may still study the seven forms of Geysir life. First, is the baby still sleeping in the bosom of Mother Earth, the airy wreath escaping from the hot clay ground; then comes the infant breathing strongly, and at times puking in the nurse's lap; third, is the child simmering with impatience; and fourth, is the youth whose occupation is to boil over. The full-grown man is represented by the "Great Gusher" in the plenitude of its lusty power; old age, by the tranquil, sleepy "laug;" and second childhood and death, mostly from diphtheria or quincy, in the empty red pits strewed about the dwarf plain. "Patheticum est!" as the old scholiast exclaimed.

It is hardly fair to enter deeply in the history of the Great

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[1] Especially M. Dortous de Mavian, whose theory was succeeded by the age of chemicals, pyrites, and alkalis, and the oxidation of unoxidised minerals, with a brief deversion in favour of "The Fire," by Sir Humphrey Davy. Poisson extinguished it when he remarked that if fed by incandescent gases it would burst the shell, or at least would be subject to tides, causing daily earthquakes. Happily, also, the term "earth's *crust*" is also becoming obsolete, or rather the solid stratum of 100 miles overlying a melted nucleus has suddenly grown to 800 (Hopkins). Sir William Thomson (Proceedings of the Royal Society, xii., p. 103) holds it "extremely improbable that any crust thinner than 2000 or 2500 miles could maintain its figure with sufficient rigidity against the tide-generating forces of sun and moon, to allow the phenomena of the ocean tides, and of precession and nutation, to be as they are now." We will hope for more presently.

Geysir, but a few words may be found useful. The silence of Ari Fróði (A.D. 1075), and of the Landnámabók, so copious in its details, suggests that it did not exist in the eleventh century; and the notice of Saxo Grammaticus in the preface to his History of Denmark proves that it had become known before the end of the thirteenth. Hence it is generally assumed that the volcanic movements of A.D. 1294, which caused the disappearance of many hot springs, produced those now existing.[1] Forbes cleverly proved the growth of the tube by deposition of silex on the lips,[2] a process which will end by sealing the spring: he placed its birth about 1060 years ago, which seems to be thoroughly reasonable; and thus for its manhood we have a period of about six centuries.

In 1770 the Geysir spouted eleven times a day; in 1814 it erupted every six hours; and in 1872 once between two and a week. Shepherd vainly waited six days; a French party seven; and there are legends of a wasted fortnight. The heights are thus given by travellers:

Ólafsson and Pállsson (1770-72),	360 feet.	
Von Troil (1772),	92 ,,	
Stanley (1789), measured with a quadrant,	96 ,,	
Lieutenant Ohlsen (1804), mentioned by Henderson, also with a quadrant,	212 ,,	
Hooker (1809), upwards of a	100 ,,	
Mackenzie (1810),	90 ,,	
Henderson (1815),	60-80 ,,	second visit, above 200 ft.
Barrow (1834),	80 ,,	
Pliny Miles (1854),	70-72 ,,	
Forbes (1860),	60-100 ,,	
Symington (1862),	200 ,,	
Baring-Gould (1863),	90-100 ,,	
Bryson (1864),	"as high as the Scott Monument."	
Robert Mackay Smith (1864),	100 measured feet.	

[1] Cleasby tells us that the end of Árna Saga (the bishop), the sole historical work of that time, is lost. He opines that a certain "pretty legend," referring to the "moving" of founts when defiled with innocent blood, could not have arisen "unless a change in the place of hot springs had been observed."

[2] Everywhere we found leaves laminated with silicious deposit, but no trace of shells, even though we sought them under the turf. The composition of Geysir water will illustrate Forbes. In 1000 parts of water there are 0·5097 of silica, whereas the rest, carbonates of soda and ammonia, sulphates of soda, potash, and magnesia, chloride and sulphide of sodium, and carbonic acid, amount only to 0·4775. Out of the latter, again, soda represents 0·3009, and sodium 0·2609; silica and soda are therefore *the* constituents. The specific gravity is 1000·8 (Faraday).

Thus the mean of the best authorities would be 80 feet, exactly equal to the *Grandes Eaux* of Versailles. The artificial maximum is popularly laid down at 90 feet. But torpedo experiments with 100 lbs. of picric powder have lifted a 2000-ton column 53 yards high; and we hear of pillars 50 feet thick reaching 123 yards. The Giant Geysir, a silicious spring near the head of the Firehole River, according to Dr F. V. Hayden, propels an 8-feet shaft by steady impulses from 150 to 200 feet from the orifice.

The shooting action of the Geysir, an affair of 700 horse-power, has been explained in four distinct and several ways: by a reservoir, by a straight tube, by a bent tube, and by no tube at all. Furthermore, one experimenter applies fire to the centre of the tube, another cold, whilst a third heats the angle. Mackenzie suggested the "hypothetical subterranean cave" which was adopted by all the writers of his day; by Scrope, Dufferin, the Napoleon Book, and many others. They all forget that the reservoir and the syphon would produce regular and not intermittent action.

The epoch-marking visit of Professor Bunsen proved, by soundings, the Geysir to be a regular tube, 60 to 74 feet deep, with a diameter of 10 feet 4 inches: he found the temperatures by *termometres à deversement* varying to a maximum of 270° (F.), or 58° above boiling point; and Mr Bryson (1864) verified these observations, making the bottom of the pipe 240°, and the centre 270°. Superheated water loses the cohesion of its particles with the expulsion of air, and, if pressure be removed, "flashes into steam;" this well-known fact at once suggested the chemist's explanation. Thus M. Müller was able to make an artificial Geysir; M. Douay of Ghent corked a straight brass tube, and caused explosion by heating it at the bottom and at half length; and Professor Tyndall followed with his pipe of galvanised iron, 6 feet long, surmounted by a basin, and girt about the centre with burning gas. Even the detonations were imitated; those of the model were explained by steam being condensed in the saucer, whose diameter is 52 to 60 feet, and whose contents are cooled by abundant evaporation—the same phenomenon on a small scale will be observed if water be heated in a bottle.

Whilst the far-famed Werner held that volcanoes were caused by the burning of coal-beds, George Stephenson, a great and original mechanical genius, more Wernerian in this point than the master himself, was so impressed by the rhythm and regularity of movements as he first sighted a volcano that he at once referred them to steam and superheated water.

But presently observers raised the valid objection that if air were liberated in large quantities, the Geysir surface would be ever boiling like that of the "Strokkr." Hence Baring-Gould suggested that an angle in the pipe is sufficient to produce all the phenomena, and he calls the following experiment "merely an adaptation of Sir George Mackenzie's theory." Bend an iron tube to 110°, making one arm half the length of the other; fill with water, and place in the fire. For a minute the liquid will remain quiet; presently it begins to quiver; steam generated in the shorter section causes a slight overflow, without signs of ebullition, till the bubble turns the angle: the column of the longer arm is then suddenly forced high in the air, and a jet of eighteen feet can be produced with a tube, whose long arm measures two feet, and whose bore is three-eighths of an inch. The bending pipe is given by Forbes (p. 252), but he has drawn no conclusions from it.

Finally, Dr Hochstetter (Revue Hebdomadaire de Chimie), whose highly interesting experiments throw much light upon volcanic action, can almost dispense with a pipe. When sulphur is melted under water, with a pressure of forty-five pounds to the square inch, the mineral absorbs part of the fluid, and as the former cools, the latter is driven out as steam accompanied by explosions. When the quantity of sulphur is excessive, upheavals take place, craters are formed, and melted brimstone is ejected.

Evidently the several theories require reconciling. A friend wrote to me: "Your suggestion of emptying the Geysir can be done only by a force pump. The long arm of a syphon would require to measure upwards of a hundred yards to find a lower level than the bottom of the tube, which lies eighty-six feet below the upper basin-rim. And even if you succeed, we shall learn very little more than what we already know, or we have reason to assume." I rejoin that the position of the spring which fills

the Geysir after each explosion, and which keeps up the constant flow over its saucer, is a matter of the greatest importance.

Ólafsson produced a new "Gusher," by simply piercing through eighteen feet of sulphur ground at Krísuvík; and in Tuscany there are artificial *soffioni*, one of which has been driven 168 metres into strata showing 145° (Centig.). In the present state of science we evidently need not despair of being able to create a Great Geysir upon the grandest scale: these eruptions come from earth's skin not from her intestines; and the subterranean laboratories of metallic bases are readily opened to oxidation.

Remains now only to walk over the ground, which divides itself into four separate patches: the extinct, to the north-west, below and extending round the north of the Laugarfjall buttress; the Great Geysir; the Strokkr and the Thikku-hverar to the south.

In the first tract earth is uniformly red, oxidised by air, not as in poetical Syria by the blood of Adonis. The hot, coarse bolus, or trachytic clay, soft and unctuous, astringent, and adhering to the tongue, is deposited in horizontal layers: snowy-white, yellow-white, ruddy, light-blue, blue-grey, mauve, purple, violet, and pale-green, are the Protean tints; often mixed and mottled, the effect of alum, sulphuric acid, and the decomposition of bisulphide of iron. The saucer of the Great Geysir is lined with Geysirite (*silica hydraté*), beads or tubercles of grey-white silica; all the others want these fungi or coral-like ornaments. The dead and dying springs show only age-rusty moulds and broken-down piles, once chimneys and ovens, resembling those of Reykir, now degraded and deformed to couthless heaps of light and dark grey. Like most of the modern features, they drained to the cold rivulet on the east, and eventually to the south. The most interesting feature is the Blesi (pronounced *Blese*), which lies 160 feet north of the Great Geysir. This hot-water pond, a Grotta Azurra, where cooking is mostly done, lies on a mound, and runs in various directions. To the north it forms a dwarf river-valley flowing west of the Great Geysir; eastward it feeds a hole of bubbling water which trickles in a streak of white sinter to the eastern rivulet and a drip-hole, apparently communicating underground with an ugly little boiler of grey-

brown, scum-streaked, bubbling mud, foul-looking as a drain. The "beautiful quiescent spring" measures forty feet by fifteen,[1] and is of reniform or insect shape, the waist being represented by a natural arch of stone spanning the hot blue depths below the stony ledges which edge them with scallops and corrugations. Hence the name; this bridge is the "blaze" streaking a pony's face. Blesi was not sealed by deposition of silex; it suddenly ceased to erupt in A.D. 1784, the year after the Skaptár convulsion, a fact which suggests the origin of the Geysirs. It is Mackenzie's "cave of blue water;" and travellers who have not enjoyed the *lapis lazuli* of the Capri grotto, indulge in raptures about its colouration. North-west of the Blesi, and distant 300 feet, is another ruin, situated on a much higher plane and showing the remains of a large silicious mound: it steams, but the breath of life comes feebly and irregularly. This is probably the "Roaring Geyser" or the "Old Geyser," which maps and plans place eighty yards from the Great Geysir.

The Great Geysir was unpropitious to us, yet we worked hard to see one of its expiring efforts. An Englishman had set up a pyramid at the edge of the saucer, and we threw in several hundredweights, hoping that the silex, acted upon by the excessive heat, might take the effect of turf; the only effects were a borborygmus which sounded somewhat like B'rr'rr't, and a shiver as if the Foul Fiend had stirred the depths. The last eruption was described to us as only a large segment of the tube, not exceeding six feet in diameter. About midnight the veteran suffered slightly from singultus. On Monday the experts mispredicted that he would exhibit between eight and nine A.M., and at one A.M. on Tuesday there was a trace of second-childhood life. After the usual eructation, a general bubble, half veiled in white vapour, rose like a gigantic glass-shade from the still surface, and the troubled water trickled down the basin sides in miniature boiling cascades. Thence it flowed eastwards by a single waste-channel which presently forms a delta of two arms, the base being the cold, rapid, and brawling rivulet: the

[1] More exactly the two divisions are each about twenty feet long; the smaller is twelve and the greater is eighteen feet broad; the extreme depth is thirty feet.

northern fork has a dwarf "force," used as a *douche*, and the southern exceeds it in length, measuring some 350 paces.

We were more fortunate with the irascible Strokkr, whose name has been generally misinterpreted. Dillon calls it the piston, or churning-staff; and Barrow the "shaker:" it is simply the "hand-churn" whose upright shaft is worked up and down—the churn-like column of water suggested the resemblance. This feature, perhaps the "New Geyser" of Sir John Stanley and Henderson, formerly erupted naturally, and had all the amiable eccentricity of youth: now it must be teased or coaxed. Stanley gave it 130 feet of jet, or 36 higher than the Great Geysir; Henderson, 50 to 80; Symington, 100 to 150 feet; Bryson, "upwards of a hundred;" and Baring-Gould, "rather higher than the Geysir." We found it lying 275 feet (Mackenzie, 131 yards) south of the big brother, of which it is a mean replica. The outer diameter of the saucer is only 7 feet, the inner about 18; and it is too well drained by its silex-floored channel ever to remain full. A funnel or inverted cone, whereas the Great Geysir is a mound and a cylinder, it gives the popular idea of a crater: the upper bore is 8 feet 4 inches to 9 feet, the depth 44 to 49, and about half-way down it narrows to 11 inches. The surface is an ugly area of spluttering and even boiling water. A "fulminating dose" of twenty-four turfs and stones, with three by way of "bakhshísh," brought on the usual tame display of "bouquets d'eau in sheaves, gerbes, lanceolations, and volutes," the highest rising at most 40 feet: travellers give twelve minutes for the operation, others see it "almost instantaneously;" we had to wait more than an hour. Bryson explains (pp. 44, 45) the action of turf by its organic matter causing violent ebullition, like the mucus or albumen of eggs, which make the pot boil over, or like the vesicles in foam or custard-confining atmospheric oxygen. But a second experiment with stones only, and the want of suddenness in the outburst, made us fall back upon the homely old theory, namely, that stopping the narrow tube enables the water to overcome the pressure of the upper column. The French expedition, after duly "activising it," fired a shotted gun at the surface of the Strokkr, which is said at once to have ceased boiling.

The most interesting part to us was the fourth or southern tract. It is known as Thikku-hverar, thick caldrons (hot springs), perhaps in the sense opposed to thin or clear water. Amongst its "eruptiones flatuum," the traveller feels that he is walking

"Per ignes,
Suppositos cineri doloso."

There are at least fifty items in operation over this big lime-kiln; some without drains, others shedding either by sinter-crusted channels eastward or westward through turf and humus to the swampy stream. It shows an immense variety, from the infantine puff to the cold turf-puddle; from Jack-in-the-box to the cave of blue-green water, surrounded by ledges of silex and opalline sinter (hydrate of silica), more or less broad: the infernal concert of flip-flopping, spluttering, welling, fizzing, grunting, rumbling, and growling never ceases. The prevalent tints are green and white, but livelier hues are not wanting. One "gusherling" discharges red water; and there is a spring which spouts, like an escape pipe, brown, high and strong. The "Little Geysir," which Mackenzie places 106 yards south of the Strokkr, and which has been very churlish of late years, was once seen to throw up 10 to 12 feet of clean water, like the jet of a fire-plug. The "Little Strokkr" of older travellers,[1] a "wonderfully amusing formation, which darts its waters in numerous diagonal columns every quarter of an hour," is a stufa or steam-jet in the centre of the group, but it has long ceased its "funning."

Here we tried our final experiment. The small spring farthest to the south-west, and about 310 feet from the Strokkr; raised upon a little platform of silicious laminæ, and draining southwards, has two distinct issues, one nearly circular (1 foot by 10 inches), and the other long-oval (1 foot by 6 inches), distant 2 feet 2 inches, but apparently communicating; the depth is 11 feet, after which soundings are prevented by irregularities. We blocked up both apertures with well-tamped turf. The

[1] See Barrow's ground-plan of the Geysirs (p. 177).

northern remained closed. After forty minutes, the southern began to play; it threw up gerbes some 30 feet, which showed fragments of "Geysir rainbow," and this lasted at least an hour and a half, after which it was completely exhausted; its earths were stopped next morning, but during six hours there were no results. Simultaneously with this eruption, and reminding us of Horrebow's sympathetic water, the Red Mouth, a dwarf basin some 440 feet to the south-east, into which we had also thrown stones, began to play. This experiment suggested considerable doubts as to the general applicability of all existing theories. Another point which still remains for inquiry is that of the Salses or cones emitting slime and hydrogen. In the United States it is supposed that these "mud-puffs" begin as clear Geysirs, or as boiling springs, and that they become thicker and thicker till the heat dies out, when the fetid matter no longer appears. As far as I know, the theory has never been applied to Iceland.

I cannot but hold the Geysirs, in their present condition, to be like Hekla, gross humbugs; and if their decline continues so rapidly, in a few years there will be nothing save a vulgar solfatara, 440 by 150 yards in extent. But, luckily for the sight-seer, facilities of travel increase in still greater proportion. A few will visit the jetting boiling water near the beautiful Lake Roto-ma in New Zealand, made known to us by the Curse of Manaia. Many will picnic to the "Grand National Park" of the Yellowstone, where, as in the new hemisphere generally, every feature, lakes and cataracts, forest and cañon, is on a scale unknown to the old.[1] Here the Mud Geysir (Firehole Basin) is a greater Strokkr; the Mud Puffs are the Thikku-hverar *en grand;* and the silicious mound of the "Giant Geysir" is so broken that its sinuous orifices expose the boiling water forty feet below, and its paroxysms have lasted three hours.

After this depreciatory notice of another "Wonder of the

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[1] In 1859, when I passed over the Rocky Mountains, near the headwaters of the Missouri and the Yellowstone, the North American Geysirs had not been invented, nor did we hear a word about them from the backwoodsmen and prairiemen along the line. In fact, the United States Expeditions which surveyed, photographed, and described them, began only in 1868.

World," it is only fair to the reader that he should be supplied with a description of it by a more enthusiastic pen.

"I was particularly fortunate," writes a friend from Edinburgh, "in witnessing two grand eruptions of this magnificent fountain: the first from its commencement till its close.

"By the favour of the Danish Government, the 18-gun ship 'Thor' received six travellers on board in Leith Roads on the 18th of June 1855. My friend the late Dr Robert Chambers, in his 'Tracings of Iceland and the Faroe Islands,' gives an interesting account of our voyage, of a boat trip with him and a friend through the Faroe group, and of our ride to the Geysers.

"We arrived at Reykjavik on the 27th, having difficulty in getting a pilot to come on board the monster that could sail against wind and tide, the 'Thor' being the first steamer that had appeared in Iceland waters.

"After a ball at the Governor's on the evening of the 28th, we started in the morning for Thingvellir, accompanied by Captain Raffenberg, three officers of the 'Thor,' our kind host and entertainers, and by young Count Carl Trampe, son of the Governor, with forty-one horses, and arrived on the field of the Geysers in the evening of the 30th. Shortly before, as we were descending to the ford of the river, a column like smoke was observed in the distance before us; this, as we afterwards learnt, was from Geyser—one of his great displays.

"A little tent pitched near the great Geyser was not proof against the pelting rain, but I was glad to get a friend to share it, the rest of the party taking refuge at the neighbouring farmhouse.

"The night was dark, with heavy rain. Geyser (as he is emphatically called by the Icelanders) gave no sign.

"The first of July was warm and bright.

"There were several eruptions during the day, making me familiar with his operations, but there were none of them to any great height, lasting only for two or three minutes: the basin not quite emptied.

"Several eruptions of Strokkr were witnessed, two of them by giving him a dose of turf: the prescription discovered by Henderson. These were a series of violent explosions, without

any warning; the first burst went up like a rocket fifty or sixty feet, followed in such quick succession lower and higher that frequently the ascending mass passed through the descending waters, falling outwards on all sides. During the ten minutes they lasted, a stream of boiling water was given off only inferior to that of the Great Geyser.

"The last shoot into the air was generally the highest.

"It is not quite safe to be near this fellow in his spasmodic pranks, but they cannot be looked upon without amazement. The action is altogether different from that of the orderly majestic movements of the great King of all the Geysers, with whom he has evidently no connection.

"In his normal state, eight feet down from his not very pretty mouth, the water in Strokkr is always in violent ebullition.

"The estimate we formed of the extreme height of the sheaves of water was above 100 feet. In order to assist in the computation, we had measured that distance to the ground where we stood. The more practised eyes of the naval officers agreed in this estimate.

"It was now eleven P.M.; the sky as clear as day.

"With the exception of my tent friend and a companion, who had gone to visit the Little Geyser, the rest of the party had left for the night.

"Standing on the edge of the basin to windward, assisted by the Hoffmeister in measuring the line I had stretched across it at different points, several heavy thumps were felt under our feet, followed by earthquake movement, and the rolling sound, so often described, coming from a distance to the south. My assistant had thrown down the lines and fled.

"The water in the basin was as smooth as glass, the slight vapour rising being carried to the south-west, when suddenly in the centre of the basin over the well or pipe (10 feet 4 inches in diameter, as afterwards measured) the water rose, through the water in the basin, to the full circumference of the pipe (31 feet), to the height of about 3 feet.

"The column appeared for an instant as if a solid body, immediately falling into the basin, and ruffling its surface with a series of waves.

"Lord Dufferin, in his charming 'Letters from High Latitudes,' in happy illustration of this phenomenon adds in a foot-note:

'As if an angel troubled the waters.'

"Again, the water rose 5 or 6 feet, falling as before, creating a little storm in the basin, and rushing out at the two openings in the rim, the one on the north-east, the other on the east. By the third and fourth rise of these columns, following each other with increasing rapidity, the boiling water came tumbling like a cataract over the basin and down the mound on all sides. Compelled to retire a little distance, columns of water were now dimly seen following each other with loud noise, as they rushed through the tube into the air, each succeeding column higher than the one before it. These were now a series of explosions, giving off enormous clouds of steam, black from their density.

"My two friends then joined me and witnessed this rare sight in all its grandeur. The display lasted for about seven minutes from the commencement.

"Immediately after the last and highest explosion, the flow down the sides of the mound suddenly ceased, and running up and into the basin, we found it empty, and the water standing some ten feet down, the tube gradually filling again.

"The Hoffmeister of the 'Thor' had returned, and throwing some stones into the well, myriads of steam bubbles were disengaged, and rose to the surface, making him run again for his life from the wrath of the demon he had thus provoked.

"2*d of July*.—Fast asleep in the tent at six in the morning. I was roused by the underground thundering to the south: my friend, who was up, had looked out and thought it was only an abortive attempt; the noise continued, accompanied by the sound of rushing waters near us. Following my friend, I lost him for a minute or two in the dense mass of steam, which smelt of sulphur, but he speedily joined me in my former position; and before the explosions had attained their highest elevation, the whole party were near us. Their opinion was, that the height the explosions had attained was quite as great as that of Strokkr on the previous day. I was much too near to form any adequate opinion. Rising above the dense clouds of vapour, the

water in columns was distinctly seen opening out at the top into separate shoots at varying heights, the lower curving outwards, the higher shot up perpendicular, and shattered into diamond drops, sparkling in the sun. The well opens up trumpet-shape into the basin, the diameter of the curve being about 2 feet 6 inches. To this it appears to be due that most of the water falls outside its margin.

"From one of the last columns about a third broke off, and, bending between me and the sun, left his image quite black upon the retina.

"Prepared for the close, we had reached the basin in time to see the last portion of its contents running into the well, leaving the basin burning hot, and not a drop of water in it. The well was standing about 12 feet down, the water slowly rising, and taking about 15 minutes again to fill the basin.

"During these eruptions the rush of boiling water never ceased; but uniting to the east of the mound, it flowed down to the river in a continuous stream, in some places 20 yards in breadth.

"Taking the average height of the columns of water at 45 feet, and eight shoots in a minute during a period of eruption of 7½ minutes, the discharge is 1,410,600 gallons; or take one column 80 feet by 10 feet 4 inches diameter, gives 41,797 gallons at one discharge; a shot weighing 186 tons 11 cwts. 3 qrs. 17 lbs. from this great gun, to which the Woolwich Infant is but a babe.

"To the eye, so far as could be seen, the pipe was quite cylindrical; and, plumbed all round, no irregularity was discovered, except at the bottom, which was very irregular, giving to my line a depth of 80 feet on one side, 82 on the other. My tent companion and friend, the late Robert Allan, in a paper read at the meeting of the British Association at Glasgow in 1855, and published in its Transactions, gave the depth 83 feet 2 inches. The diameter of the basin from two points—72 feet 6 inches, 68 feet 1 inch: my four measurements taken twice on the surface of the water gives the average of 66 feet.

"Assembled round the basin, which had now filled, the water smooth and bright, with a thin screen of vapour carried to the south, a curious discovery was made. Standing with his back

to the sun, and looking into the basin, the spectator saw his face and head clear as in a mirror, surrounded by a halo of bright prismatic colours. The coloured rays extended round the head to the distance of 2 or 3 feet, forming two-thirds to three-fourths of a circle, the lower portion wanting. The observer could only see his own likeness, not that of his neighbour.

"The temperature of Geyser at rest varied from 180° to 188°, but no perceptible difference was noticed before or after the explosions.

"The heat of the water may be ascertained very nearly by observing the amount of steam given off.

"During eruptions the water was expelled at a temperature far above the boiling point, as the dense masses of steam clearly showed.

"There was no steam from Geyser, which was not given out from the water itself, during the explosions.

"On examining the basin, little ripple markings were found all over its surface, similar to what are left on the sands of the sea by the retiring tide.

"It was unbroken by sacrilegious chisel and hammer, then busily employed by all three in collecting specimens.

"On my visit three years after, in 1858, some of these rejected specimens were found so firmly cemented in the place they were left that my hammer could not disengage them without tearing up a portion of the rock to which they adhered.

"In the little pools on the sides of the mound films of pure silica were discovered; and on the edge of the little falls of the stream towards the river I got some good specimens of calcedony in process of formation, but they were too brittle to carry safely away.

"On my second visit to the Geysers I was congratulated by Captain Verron of the 'Artemise' of being sure to witness a grand eruption, seeing he had been two days there without one; but, storm-stayed for four days, and never out of sight of my tent, I was disappointed. The incessant rain had so subdued the motive powers of action that the Great Geyser seldom rose near half his former height. Strokkr growled, making some praise-

worthy efforts, and the smaller Geysers did their best under such adverse circumstances.

"Among the preparations made I had for ascertaining the temperature of the well of the Geyser:

"1. A cord repeatedly shrunk in hot water, then stretched, and marked every ten feet.

"2. Another to span the basin with a ring in the centre, through which No. 1 was passed.

"The thermometer being attached to No. 1, was let down into the tube every 10 feet successively, and with the help of two assistants on opposite sides of the basin, bringing it home to note the temperature.

"Unfortunately, a Negretti by Stevenson, though in a case, and well protected, got injured during the operation; one of the screws which fastened the glass tube to its case was out, and a bit at the upper end broken off. The injury I found, after all, would not have amounted to more than a difference of 5° to 6° Fahrenheit in temperature, but I had lost confidence in it.

"So far as observed, the temperature rose very nearly in proportion to the depth of the well, from about 188° at the top to about 260° at the bottom."

The following are the temperature measurements at the Great Geyser, taken on August 6 and 7, 1874, and given on April 29, 1875, at the Royal Society of Edinburgh by Robert Walker, Esq., a Fellow of the Society:

Depth in feet from surface.	Observed temperature (Fahr.).
0 = ...	187°
10·5 = ...	190°
18 = ...	197°
27 = ...	211°
36 = ...	243°
39 = ...	247°
45 = ...	250°·5
49·5 = ...	254°
54 = ...	256°·5
58·5 = ...	254° (?)
67·5 = ...	259°·5
77·5 = ...	257°

"As an example of change in these springs: on the first visit, a pool was found near the Little Geyser, from which a stream ran eastwards, the temperature on the surface was 168°; adhering to the sides thick fleshy leaves of Algæ of a greenish-brown colour were floating. The spot was marked, and three years after the Algæ were gone, all but a little on the sides, the temperature reduced to 139°, the water had sunk down, and the stream had ceased, leaving its former course quite discernible by the grass which covered it being of a lighter green tint than that on each side of its course. To the west, steam issued out of a minute hole: a stroke of the hammer disclosed a little pool in ebullition, but the temperature was only 184°. Is this little fellow destined at some future day to rival his companions?

"Between the Geyser and the beautiful caverns often described there is an ugly hole about 8 feet diameter, most dangerous, and horrible to look at; unlike all the rest, containing the purest water, it is filled to within 4 or 5 feet of its mouth with a silicious paste of a dark-brown colour, of the consistency of porridge, alternately popling and boiling furiously.

"Visiting Reykir in 1858, we were informed by the pastor that the period of *its* Geyser was just six hours, so we had but an hour to wait. True to time, the water gradually rose with a continuous flow, rising higher and higher during a space of twenty minutes, until it had reached a height of 38 feet. A little instrument, designed by the Astronomer Royal for Scotland, with the aid of a friend from Bo'ness, was sufficient to give this close approximation.

"The charm of the Geyser at Reykir could not be exceeded; the shafts, as they rose, curved outwards all round in perfect symmetry, a tree of live water, throwing off steam, but not sufficient to obscure its marvellous beauty, as the sun played and sparkled among its branches.

"It is difficult to account for these various phenomena.

"Place a glass tube half filled with water over a lamp or gas light. After the water is boiled, it will be ejected by successive spurts; and looking at the bottom of the tube, an air space will be seen, expanding as the water is ejected. This is the explosive material so often referred to, and it is upon this operation

that the diminutive Geysers have been constructed to so far explain the action and time of these water volcanoes.

"The observations made upon these two visits led me to the following conclusions as to the phenomena accompanying the eruptions of the Great Geyser:

"The cavity of Sir George Mackenzie, or boiler, as I shall here term it, I would place from 200 to 230 yards to the south of it, not far from the little Strokkr, from which the sound of underground 'artillery' is heard to proceed. Here it is that the explosive force—highly superheated steam—is generated. Connected with it and the underground passage to Geyser is the reservoir of hot water.

"These underground caverns are numerous over Iceland, Surseitler being the most famous; in it the sides of the cave, a mile in length, are smooth and rounded to the ceiling, evidently formed when the lava was in a plastic state—blown out like the molten glass under the hands of the bottle-maker. From the roof large blocks had fallen, rendering the passage extremely difficult.

"It seems highly probable that the cause of the sharp rattling noise heard during eruption is due to such loose angular masses of lava rock being driven against each other with the force that propelled the rush of waters to the Geyser. The explosive force unequal at first to impel more than a portion of water up the tube, the resistance becomes less as the reservoir gets emptied by its escape up the tube, and so the water is propelled higher and higher to the last. The explosions cease by the steam in the boiler being suddenly condensed, and the vacuum thus created drawing back the water from the passage, and from the basin, and in part from the well. The premonitory thumps were probably caused by the first waves of the rushing mass of water striking against a wall of rock close to the bottom of the well.

"Numerous Geysers worthy of note are scattered all over Iceland, the joint production of water and the subterranean fires which underlie them."

Section IV.—To Thingvellir and back to Reykjavik.

The next morning (July 16) saw our departure. The breeze had chopped round to the north, and, perhaps, this change of wind produced the general excitement which we noticed in the springs. Both yesterday and to-day several parties of Icelanders came to see the sights, the women shawled to the ears, despite the hot sun, and with bodices unpleasantly tight-laced by lines of eyelet-holes across the breast. Formerly the people "never passed the Geysir without spitting into it; or, as they say, *utí Fjandans munn* —into the Devil's mouth." We set off at eleven A.M., passing south-south-west to the Laug farm, where some travellers have slept and "lost the eruption," and crossing the filthy swamp, where sheep graze and curlews scream, we forded the little stream which drains between the Laugarfjall and its trachytic outlier. The approach to the thermæ from the south is even meaner than the eastern, a dwarf slope of bright-coloured ground trending from the concave lump to the Túngufljót.

Most of this march is only fit for the itinerary. The path in places becomes like the hollow ways of the Brazil, whose gullies spread over a hundred yards of ground, and the "forest," as on the Anti-Libanus, shows more root than bole, the tree hugging earth, as it were, to save itself from being blown away. The first chapel farm gives an extensive view of the coast features and of the highly picturesque formations, the Jarlhettur rampart, the twin bluffs and spines of Hagafell, and the grim, black isolated castellation of Hljóðufell, outlying the Lángjökull. At about half-past one P.M., warned by a rustling which was mistaken for that of the forest, we came "lickity, lickity, switch," upon the planks of the Brúará or Bridgewater: in Perthshire there is also a Bruar, so called from its natural arch. Gaimard, carefully copied by later writers, shows a plank forty feet long, utterly undefended by "gardefou," and "spanning the depths of a narrow cleft in a precipice," where men "rush for their lives," and where "the danger is at least a hundred feet." Symington was reminded of the Mósi-wá-túnyá (Victoria) Falls, the Niagara of South Africa! The river, classical in Iceland story

for the lynching of Jón Gerikson, the Swedish bishop, here washes over a rocky channel about 160 feet broad. There is a ferry below; higher up a gash, nearly 100 yards long, forms a wedge-shaped crevasse, opening down stream, and a drop of half-a-dozen feet in the bed combines to make a miniature horse-shoe, over which the blue water pours, foaming and mildly roaring. Over the gash is thrown a bridge of twelve planks,[1] some twelve feet broad, and well guarded by iron-cramped rails. Man must lately have suffered from "Dil. Tre." to feel nervous in such a place, and we went our ways laughing.

Shortly after six P.M. we sighted Thingvallavatn, the "monarch of Iceland lakes," an expanse of placid blue, ruffled by the pleasant south. Its two crater-islets are Nesjaey, small and green, near the western shore, and larger Sandey, a two-pronged lump of black stone and green turf, rising a little south of a "Lisán," a dark foreland projected by the eastern shore. Shortly afterwards we came suddenly upon the Hrafnagjá, or Raven's Geo,[2] whose "startling depths" extend from the snow-patched Hrafnabjörg, or Raven's Crag, about four miles long to the Vellankatla, Bay of the Lake. This longitudinal crevasse is the facsimile of a "Ká'ah" in Haurânic Leja or the Refuge; the long parallel lines show corresponding angles, and there is little difference of level between the upper and lower lips of the barranco; in fact, it is the lateral rent to be found, in a smaller scale, upon every lava-field. The arched form is common to such streams, and where the sides find a soft and yielding foundation, and cold contracts the heated mass, it splits on both sides of the major axis, and thus forms chasms, often one or more, upon each flank. Here, at least, no "collapse theory" is wanted.

A fair causeway across the Raven's Rift is made by the falling of many rocks. Upon the lower slopes we found "forest,"

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[1] Baring-Gould makes the bridge seven to eight yards long; far too long for single planks.

[2] Written Ravnegiá, and other barbarous forms. Gjá also has been corrupted to Gaia, etc. The word is found in the Hebrew גיא, the Greek γâια, and the German and Swiss Gau, a district, a canton; it is preserved in the Scottish Geo or Geow: it is the Cornish Hor, and the Skaare of the Færoes, supposed to extend under the sea. It "often denotes a rift, with a tarn or pool at bottom, whence Gil is a rift with running water;" and it is akin to Gína (χαινω, A.S. Gínan); Gähnen, to yawn (Cleasby). In Iceland these fosses are split by the hammer of Thor.

which does not exist on the sister formation. We then crossed the eastern or, as it is known in history, the "upper plain;" the surface on both sides of the path is streaked with "Geos," mostly running parallel; we remarked one disposed obliquely to the lay, and the various names given to us were Háflagjá, Hólagjá, and Breðnigjá. At half-past nine P.M. we entered the Thingvellir church: the altar-piece, a Last Supper, is old; the pulpit dates from A.D. 1683; and the loft is not, as usual, a store-room for the farm, but a sleeping apartment for travellers, provided with pillows and mattresses, decently clean. Prófastr Bech was happily absent: his wife sent us forelles and Kaka,[1] thin rye cakes, but Icelandic modesty did not admit of our seeing the lady.

The next morning was spent in prospecting the humble wonders of Thingvellir; the Tingvold of Norway; the Dyngsted of Oldenburg;[2] the Dingwall of Ross-shire; the Tingwall of Hjaltland; and Tynwald of Dumfries and the Isle of Man. This assembly plain owes all its fame to history; its civilising influence upon the race reminds us of the annual reunions of the Greeks at Delphi, and the Hebrews at Jerusalem. Sentimentalists would restore the obsolete practice, and transfer the legislators from their comfortable hall at Reykjavik to this wild and savage spot—why not propose that the barons of England meet in parliament at Runnymede?

The lake is computed at thirty miles in circumference, and the depth in places to exceed a hundred fathoms. The aspect on a cloudless morning is that of the humble Scotch waters, wanting only gentlemen's seats and a small steamer: here, however, we are in Snowland, and we see it. The depressed plain begins with the rugged delta of the Öxará,[3] or Axewater, and runs to the north-east about four miles each way: the limits north and south are mountains and hills, east and west run the

[1] This is evidently the Germ. Kuchen and the Eng. Cake: we can trace it back to the Pers. "Kahk."

[2] According to Blackwall, the Thingstead in Oldenburg still shows the Doom-ring of upright stones, and the Blót-steinn in the centre.

[3] The Axewater, so called because Kettlebjörn, the Old, when prospecting for a residence here, lost his axe. Barrow gives Oxera, which would mean Ox-water. There has been no change in the Thingvellir since the days of the Norwegian colonists.

twin "stone-streams." Maps and plans make all the lava flow to the south-west from Skjaldbreið: this must be an error, as in parts it would flow upwards. I suspect a crater behind Hrafnabjörg, whence issued the double stream, which can be seen from Thingvellir: the two forks circled round that burnt red cone, anastomosed, and formed the Hrafnagjá and two shorter Geos in the eastern half of the same stone-torrent: the latter do not cut the road, but they are visible from every height. The fiery flood west of the plain which forms the Almannagjá (all-men

LÖGBERG AND ALMANNAGJA.

or great rift),[1] is not so easily traced. A traveller might pass a satisfactory week to himself and others by journeying to Skjaldbreið, where a path leads, and by ascending the mountain high enough to map the lava-sources and the streams which form the two Geos.

The popular theory is, that the whole plain, an item of the pyroxenic plateau from Reykjavik to Geysir, has bodily "dropped at once and subsided" to its present level, leaving

[1] Al-manna, genitive plural from an obsolete Almenn (comp. Alemanni), is a prefix to some nouns, meaning general, common, universal. The local name of the great rift near the Althing was given because all the people met upon its eastern flank (Cleasby).

exposed a section of the rent rocks on either side. It reposes solely on the evidence of the two parallel Geos, and I do not see that they bear it out. Both of the inner sides have sunk, not from subterraneous crevassing, but because the strips of ground which subtended them could not bear the weight. Mr Scrope would account for the fosses, not by vertical settlement of superficial lava into any cavity beneath, but by the "simple and usual process, the bulk of the semi-fluid lava-stream, upon the cessation of supply from above, having run out into the depths of the Thingvalla Lake." The normal operation of this movement, however, is to form a tunnel, not an open trough, and this objection is one of the least.

The contrast of mountain and water, as usual, gives a certain picturesqueness to the site. South-east of the lake rises the Búrfell, here a goodly presence, and no longer the little cone seen from about Reykir; south lies familiar Ingólfsfjall, and south-west towers the "tall hanging hill," Hengilshöfði, famed for sulphur springs; snow-streaked, blue-tinted, and shaped somewhat like an elephant's head. Wheeling round to face north-west, we see the pinnacles of Súlarfell, bristled as with trees; the fretted peaks about Gagnheiði; the dull black heap of Ármannsfell, so called from Orman the Irish giant, who there lies in his grave; and the ridgelet of Jornkliff, crouching below it. There to north-east stands Skjaldbreið, shield-shaped as its name says, ending in a snow-flaked umbo which suggests a crater. The peaks of Tindaskagi at its foot apparently connect with the great Hrafnabjörg; and far behind them, but brought near by the surpassing atmospheric clearness, sparkle the snows of Lángjökull. The eastern view ends with the quaint serrations of Dímon, which may be either lava blisters, or the lips of a true crater, with the long buttress-like promontory of Arnarfell, and with the background heights of Miðfell.

Dasent's "Topography of the Thingfield,"[1] will confine our notices of details to a narrow range. We inspected the Ell-stone or Fathom-stone, a block of vesicular lava, 4 feet 9 inches high, opposite the church door, and planted upon a rubble foun-

[1] A large plan, but not very correct, is given by Dufferin (p. 73).

dation. The six lines upon the east face measure 1 foot 9 inches, 11 (10·50), 8, 7, 5, and 4 inches; they may be standards, but they look like the work of nature. We then walked up to the grassy site of the Althing, and that local Sinai, the Lögberg or Moothill, the latter a natural stone-mound to the north. Parliament was formerly held on an island; it was for the best of reasons transferred here, where the public was railed off by deep chasms, and where hon. members could be attacked only by a single gateway. So the Shetland Tingwall (Thingvöllr) was held on a holm,[1] accessible only by stepping-stones, and the Thing-booths were on the lake-plain. East is the Hrossagjá, and 20 yards west, the Nikolásagjá,[2] with the smaller Brennrugjá below the latter. These miniatures of the two great rifts, distant about a mile and a half from the lake, are of crumbling sub-columnar black rock, varying from 16 to 40 feet in breadth, and falling sheer some 30 feet to clear blue-green water, whose depths show detached blocks of lava. The two former unite to the north, the second and third to the south, enclosing a long oval with a natural bridge, a few feet wide, to the south-east. We admired the leap, worthy of Morton and the Black Linn, by which Flosi escaped the "blood-stone;" this article was shown to us on the western bank of the Hrossagjá, a detached slice some 12 feet long, whence the victim would fall into the "Geo." Below to the west lay the lower Öxará, which has probably changed all its features since Njál's day. Yet the guides still point out the islet, where holm-gangs were fought in presence of the multitude;[3] and amongst the sand-banks formed by ankle-

[1] I believe it has been transferred by later antiquaries from the holm to the mainland; but Cowie (p. 178) still keeps it in the islet.

[2] This Gjá is amazingly exaggerated by Baring-Gould (p. 69); assuming the human figures at only 5 feet, the depth of the chasm would be 75.

[3] For the code of honour in pagan Iceland, Dasent refers to Kormak's Saga, chap. x., where the law of the duello was most punctiliously laid down as the "British Code of Duel" (London, 1824) by a philanthropic and enterprising Irish gentleman. The weapons chiefly used were broadsword and battle-axe; the combatants might not step back beyond a given space, and the latter peculiarity is still preserved in the hostile meetings of students throughout Northern Germany, where the floor or ground is marked with chalk. In some cases they stood upon a hide and were not allowed to gain or to break ground. The Hólm-ganga was a "judicium Dei," differing from the Einvígi, or simple duel, by the rites and rules which accompanied it. The Norwegian duel was worthy of the Scrithofinni; the combatants were fastened together by the belt, and used their knives till one was killed. How pugnacious the old pagan Scandinavians were, may be judged from

deep rivulets, the "Thorleifshólmr," upon which criminals were beheaded.

I passed the greater part of the morning examining the Almannagjá, whose total length is about two miles,[1] and the average breadth 100 feet. Ascending the outer or eastern edge by a slope of 20°, I found the upper strata to be ropy, treacly, and scoriaceous lava, whilst below and inside the couches are hard and crystalline. There is a slip in the "Topography of the Thingfield" (p. cxxvii.), where it says, "about a mile and a half from where the great rift touches the lake, its inner lip ceases," and the "Enlarged Plan" makes it break off where it is very distinctly marked. The sole was a mass of *débris* fallen from the sides, and good pasture streaked with many a path. Up the chasm there are rude dry walls of mortarless stone, the Makíl of the Syrian goat-herd, and serving as Sæters for sheep—the guides declare them to be the Búðir of the old Thingmen, but their booths did not extend north of the river. The upper or western wall, whose crest is weathered into pinnacles, varies from 80 to a maximum of 100 feet, whilst the lower ranges from 30 to 50; both are perpendicular and show stratifications which seem to proceed from a succession of discharges.

The Axewater, above the "Geo," is a stream like an English rivulet, flowing through a wild and desolate Heiði. It tumbles over the western lip by a gap about 50 feet high; here the layers of lava are well defined on both sides, and it is easy to climb up either flank of the toy cascade. This fall was sighted during the last march, and suggested great expectations as the foot was hidden. M. Gaimard takes the liberty of removing the screen, and showing the whole height prodigiously exaggerated. It does not "explode in a cataract," but falls decently into a font-like kieve, and threads the sand and boulders of the Geo. After a few yards it finds a gap in the inner lip, and here it dashes towards the plain with two falls, mere steps in the rock. In the lower basin, "sack-packed wretched females"—the author must

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the wife's practice of carrying the husband's shroud to weddings and "merry makings."

[1] Paijkull gives the length, one geographical mile, and the maximum depth, 140 feet; too short and too deep.

have been dreaming of the Bosphorus—were let down by ropes and drowned as a punishment for infanticide. Farther on, witches were burned; less lucky than other travellers, I could not find their bones. After thus bisecting the Geo from north-west to south-east, the Axewater runs along its eastern base, and enters the Thingvallavatn. The latter is drained to the south-east by the Sog (inlet) outlet, which eventually feeds the Ölfusá or lower Hvítá; it may be reached in five hours' sharp riding from Thingvellir, and in about double that time from Reykjavik. Here in July any quantity of salmon-trout may be caught; the fish lie above the first foss thick as water-plants. My informant had taken twenty-five in one day; the heaviest was 7 lbs., and only two weighed under 6 lbs.; but he had been almost blinded by the plagues of gnats and flies, which covered his pony with blood-points.

In the afternoon we rode merrily "home." The road began by fording the Axewater, after which was a rude causeway of basalt, about thirty feet long, ascending the eastern lip. It crossed diagonally the grassy surface of the "Geo," and climbed the western wall. A short ramp, paved for beasts, like a bad flight of steps, runs between the true rampart and a slice of rock which has been parted from it. Travellers usually sight it from above, hence we read of the "frightful dangerous chasm," and we are told (N.B.—*not* by an Irishman) that "this is perhaps the most unique scene in the world." The moderns compare it with the "Devil's Staircase" in the Pass of Glencoe. The path would hardly startle the most nervous girl, and a Harfushi horseman would gallop his Arab up and down it.

Reaching the summit, we spurred across the Mossfellsheiði, which those fresh from home describe as a "horrible stony waste, bordered by lofty mountains." But we had met with worse things than this "ever-to-be-avoided heiði," where, moreover, labourers were working at the road. Seen in bad weather, it must be grim enough, as the many "stone-men" show; hence, doubtless, general complaints about the "mournful wail of the plover, and the wild scream of the curlew."[1] We found a

[1] The curlew (*Scolopax arquata*), when young, is apparently called a whimbrel (*Numenius phæopus*) in the London market.

number of these birds, besides sandpipers, purple oyster-breakers, whimbrels, whose "soft fluid jug," according to the "Oxonian," "is not unlike the nightingale's song," and a fair scatter of ravens. I proposed a turkey-buzzard on a blasted tree, proper, as the arms of Dahome, and Grip on a lava pinnacle would suit Iceland passing well.

The only interest of this day's ride is, that it crosses the "great trachytic band" opposed to the lesser trachytic band of Snæfellsjökull; the former made by old writers to stretch clean across Iceland from near Reykjanes (south-west) to Langanes (north-east). We examined a few veins of that rock, but the surface was mainly lava above and Palagonite below. The latter is said to be remarkably well developed in the Seljaland gorge,[1] and we dismounted to secure red specimens, and to find, if possible, an Irish rose. This feature, I suppose, is one writer's "vast precipice, where there is only about sixteen inches to tread on," and the "deep ravine, wild, horrid, and frightful," of another pen, whose pencil supplies it with a herd of deer.

As we drew near Reykjavik the sun, after shimmering horizontally along the ground, obliged us by occasionally setting behind the hills, and when it

> "Burned
> The old farm-gable, we thought it turned
> The milk that fell in a babbling flood
> Into the milk-pail, red as blood."

The moon arose with a judicious repression of details: the silver light, the dark purple brooding at the hill-feet, and the gleam of the golden west gave more colour than usual to the view. The ponies, under boxes now empty, seemed to fly as they scented home. The only difference in the familiar scene was a vast eruption of peat-stacks, made, like hay, whilst the sun shines. Shortly before midnight we were again at home: in Iceland there are no hours, and kind-hearted Frú Jonassen did not keep us waiting either for supper or for bed.

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[1] It is analysed by Bunsen (Art. II., loc. cit.).

ITINERARY FROM REYKJAVIK TO HEKLA AND THE GEYSIR VIA KRÍSUVÍK.

Reykjavik to Krísuvík.

Monday, July 8, 1872.

Left Reykjavik at A.M. 11.30. Rounded heads of two dwarf Fjörðs (1 P.M.), Fosvogr and Kópavogr (seal-cub voe); turf at valley-heads.

1.45 P.M.—Hafnafjörð = 2 hours 15 min. riding; path tolerable up torrent bed; crossed first divide of rugged ropy lava; path bad.

3.20 P.M. (= 3 hours 50 min.).—Changed horses in grassy cup-shaped hollow, under broken wall of lava.

3.30 P.M.—Started again; at 4 P.M. forded Kaldá (cold water) River.

4.45 P.M.—Short halt on grassy bottom at foot of Lángahlíð.

6.30 P.M. (= 7 hours).—Kleifarvatn (cliff-water); path along western shore of lake.

7.15 P.M.—Left lake; over bog and up hill.

⊙ I. 8.30 P.M.—Reached Krísuvík (Bay of Krísa, proper name of woman), 5 hours + 3.50 = 8 hours 50 min. Frequent halts and delays with pack-saddles. At most 3 miles per hour by 9 = 27 indirect statute miles. People call the distance "10 to 15 miles." Road upon map, 16 direct geographical miles from Reykjavik to Krísuvík. General direction, north to south with a little westing.

Good, grey, travelling day; no sun and no rain till night.

Paid at Krísuvík, $1, 3m. 0sk. (the cheapest).

Krísuvík to Litlaland.

July 9.

Left Krísuvík 10.45 A.M.; floundered over bog. Great arid plateau of Iceland to left.

11.45.—Crossed rocky divide. Short cut over livid plain of lava; sea to right; road along slopes.

12.45.—Entered great lava-field, which lasted with intermissions throughout day.

1.15 P.M.—Sweet-water lakelet (not shown on map) of Herdisarvík (Her-dís, proper name); first great lava-stream ends.

3.15 P.M.—Rode across Hlíðarvatn, at foot of Lángahlíð, now not open to sea as in map; water brackish. Halted 1 hour near Vogsósar (voe's mouths) farm; gnats and flies. Rode 4 hours 30 min. = 13½ indirect statute miles.

4.15 P.M.—Left Vogsósar. Basaltic sands and shells; thin grass. Then loose sand and old flow of lava; domes, caves, and circular blow-holes, like those of the Haurán. Deep sand, black and red. Rocky divide; went gently over the stones.

7.30 P.M.—Passed Hlíðarendi (not *the* Lithe-end, or Ridge-end) to the left (north); farm under green slope.

Forded streamlet in swampy river-valley; rough causeway; should have crossed at the stone-man farther down.

⊙ II. 8 P.M.—Reached Litlaland; five-gabled farm of Magnús Magnússon. Rode 3 hours 30 min. = 11 indirect statute miles. Total, 8 hours = 24½ indirect statute miles; on map, 19 direct geographical miles. General direction, west to east.

Misty morn. Day like yesterday, but more sun. Wind ranged from south-east to north. At night cirri; show clear day to-morrow.

Paid $2, 0m. 0sk.

Litlaland to Reykir and Laugardælir Farm.

July 10.

Set out 10.30 A.M. Up rise over cindery lava.

11.30.—Road forks, right branch leading to big farm. Took path to left; reached old beach, water-worn galettes lying in long lines. Skálafell above to left (north-west).

11.35.—Right bank of Ölfusá (proper name) valley, higher up called the Sog. Ölfusvatn is the old name for Thingvallavatn.

11.45.—Hjalli (a hillock, much the same as "Hóll;" Cleasby says, "a shelf or ledge in a mountain-side"); chapel farm. Skirted tall Palagonite precipice on left.

1 P.M.—Passed through Níupat (?), filthy Bær, dunghill to pony's knees. Up right bank of Varmá, influent of broad Ölfusá. Wet riding, water draining and sinking from above. Then white, smooth soil.

1.50 P.M.—Forded Varmá; easy descent and ascent; water to horses' knees. Left baggage animals. Reached Reykir 2 P.M. Morning ride, 3 hours 40 min. by 4 miles = 16 indirect statute miles; on map, 9 direct geographical miles. Direction, south-west to north-east.

Left Reykir 3.40 P.M. Circled round south of hill spine dividing Varmá and Ölfusá. Forded two small streams and trotted over causeway (Brú), here common, with some dwarf bridges. After third stream fine riding along west and south walls of Ingólfsfjall. On slopes and at tongue-tip fallen masses of light, lavender-coloured Palagonite, water-worn to shape of volcanic bombs. Crossed two causeways, down slope of Ölfusá valley.

⊙ III. At 6.45, ferry of Laugardælir; spent 1 hour 20 min. in crossing. Reached farm of Sæmund Bjarnarson 8 P.M. Afternoon ride, 3 hours by 5 = 15 miles; on map, 6 direct geographical miles. Direction, north-north-west to south-south-east. Total ride, 6 hours 45 min. = 30 indirect statute miles; on map, 15 miles. General direction, south-south-west to north-north-east.

Weather charming; real enjoyment. Sun clear, not hot; high north-easter; lofty cirri and woolpack. Evening cloudy. Rain at night; wind changed to west and south-west; heat brought bad weather.

At ferry paid $1, and the bishop paid $2. Tariff, 10sk. Danish per horse, and 12sk. per man or load. Pays well at this season; travellers by day and night. Englishmen have been asked $20 and got off with $12 (rascality of guide ?).

For lodging (church) and forage, coffee and biscuits, paid $3.

Laugardælir to Thjórsárholt Ferry.

July 11.

Horses strayed. Left at noon. Over delta-like flat between Hvítá and Thjórsá (bull's water); to north of former, detached hills of Búrfell (a cabochon seen from north and south, and a

hogsback elsewhere), Stóraborg, and Hestfjall, resembling dots. Bog on old lava: stone outcrops at places; wettest part often most solid base.

1.30 P.M.—Hraungerði (lava garth) chapel; two farms 8 miles from ferry; horses and neat cattle.

2 P.M.—Hill dividing Ölfusá and Thjórsá. Rough work; showed lake-country below, and Thjórsá line raised by refraction. Along natural lava-dyke to dismal, dreary moor, all knobs and hummocks. Even ravens avoid it in this weather.

4.30 P.M. (3 hours 30 min. = 18 indirect statute miles).—Halted thirty minutes and changed horses at Lángamýri; large farm-house, one of many; wire fence, two strands, and stripped branches for hedge.

5 P.M.—Remounted. Bad riding.

5.40.—Came upon Thjórsá. Ólafsvellir to left; ferry saves distance, but dangerous in fierce wind. Path along stream excellent, black basaltic sand, at times cut off corners, clay covering sand. Turned from north-east to east. Farms and cattle. Passed Sandlækr and tall riverine islet, Arnesthing. "Rústir," or ruins, on right. Ponies tired; when leaving river often lost way.

7 P.M.—Country more thickly peopled.

⊙ IV. 8.30 P.M.—At Thjórsárholt ferry-house (3 hours 30 min. = 20 miles). Total 8 hours, varying pace = 46 indirect statute miles; map, 26 direct geographical miles. General direction, west-south-west to east-north-east.

Weather vile, unlike the finest month, July, as possible; forenoon cold; driving rain. At noon stopped. Furious in afternoon. At times drizzle, like hoar-frost on grass by decomposition of light. Rain again violent till end of march.

Paid $3 for night's lodging and ferry. Tariff, 11sk. per man or pack; on return paid $1.

THJÓRSÁRHOLT TO NÆFRHOLT FARM.

June 12.

Left Thjórsárholt 10 A.M.; up stream to ferry. Spent 1 hour 30 min. crossing Thjórsá.

11.30 A.M.—Over turf of left (east) valley, like a dwarf prairie; 50 min. Many farms; good land, grassy sward, two to three feet deep. Threads of lava, with dangerous holes and sinks, sometimes covered with grass-turf. In places lava bare and broken. Crossed rivulet.

12.55 P.M.—Stóruvellir parsonage, 1 hour 30 min. = 6 miles; map, 4 direct geographical miles. Direction, south with a little easting. Place afflicted by winds from Sprengisandur, distant two to three days' ride.

2.30 P.M.—Left Stóruvellir with guide. Pastoral scene at foot of Hekla, a pampa. Sheep everywhere; ditto stinging flies throughout the inhabited part, few at Geysir.

3.45 P.M.—Leirubakki farm. Changed guides. After a few minutes reached Vestri (west) Rangá ("wrong" or crooked stream), at the mouth called Ytri (outer or uttermost) Rangá. Forded two preliminary brooks, and tethered horses together for third or main channel, girth deep. Dwarf forest, birch and willows. Then two streams, one a ditch, the other a "lavapés," flowing, like lava, north-east to south-west.

⊙ V. 5 P.M.—Næfrholt (birch-bark copse), last cottage at foot of Bjólfell, western outlier of Hekla. Formerly travellers slept at Selsund farm, south-south-west of Næfrholt.

Afternoon march, 2 hours 30 min. = 12 indirect statute miles. Total of day's ride, 4 hours = 18 indirect statute miles; map, 10 direct geographical miles.

Grey day, like the start; clouds had expended ammunition. Wind south-east. In evening weather doubtful, wind west. Hekla misted over, good sign; travellers often stopped by fogs, and even by snow, in July. Flies suddenly disappeared, wings wetted; not the case with the gnats and midges acting mosquitoes.

Instruments in evening.

Aneroid, 30·24; thermometer, 58° (F.).

Hygrometer, 4° (exceptionally dry).

At Næfrholt.

July 13.

Ascended Hekla.

Left Næfrholt 8.25 A.M.

Rode down the turf lane; crossed the dwarf stream (lavapés), up right grassy bank, and crossed again. Entered basin of "Unknown Lake"—thin strip of flat land with holes often marked by grass and willows. All "sinks" (sink-holes) and punchbowls, as if limestone country. Last thick vegetation 1500 feet high. Then into dreary region, sand and cinder; powdery red cone of fine cinder on left. Slabs of heat-altered trachyte. Obsidian of two kinds—(1.) Huge blocks of pitch-stone found from top to bottom of cone, hard and flinty (Hrafntinnu proper); and (2.) Small pieces of "Samidin," or obsidian with crystals of white jasper like that of Tenerife and other places. Bombs showed furious cannonade. Palagonite everywhere *in situ* and in scatters: some contained obsidian.

Made for big, rough lava-stream, rusty and in heaps; in places rapidly degrading, and leaving only core. Ponies sank to fetlock. Hugged left of Steiná (stone stream). After two hours' ride, at 10.30 A.M. crossed hill, reached barren divide too steep for horses.

Aneroid in air, 28·18 (difference, 2·06); thermometer, 92° (in pocket); hygrometer, 2°.

Walked up slope of divide; descended very short pitch of stone and *débris*, steepest bit of whole march. Crossed vein of lava (Sept. 2, 1845) like pulled bread, all slag and clinker; pulverising above. Reached a kind of *couloir*, a rim on left of lava-stream. Black sand and two large tongues of ice-based snow, white and brown, ridged with dirty earth, and dotted with dwarf ice-tables, sable above and ermine below. More ice as we ascended, keeping on the earthy parts. Many halts.

12.20.—Reached crater of 1845. Observed instruments.

Aneroid in air, 26·33 (difference, 3·90); thermometer, 83° (in pocket).

Stiff ascent (15 min.) to First or Southern Crater. At 1.13 P.M. sat down upon its western lip. Walking lasted 2 hours 45 min. Total ascent, 4 hours 45 min.

Aneroid, 25·94 (difference, 3·30); thermometer, 68° (air); hygrometer, 0°.

Passed over ridge, and reached snow; thence to north-east lip of Second or Northern Crater, the apex. Reached highest point 1.53 P.M. Total, 3 hours 13 min. (included halts, not bad for difference 2·56 of aneroid).

Aneroid, 25·62 (difference, 4·84); thermometer, 67°; hygrometer, 0°.

2.30 P.M.—Began descent (walked 1 hour 25 min.).

3.28 P.M.—Lowest snow.

3.45 P.M.—Mounted horses (rode slowly 1 hour 45 min.).

5.30 P.M.—Næfrholt farm. Total descent, 3 hours 10 min.

Total of ascent and descent, 7 hours 55 min. (say 8 hours).

Day clear, sun very hot; air thirsty for man and beast.

Paid guide $1, 4m. 0sk. To house for forage, etc. (two days), $5.

Næfrholt to Geysir.

July 14.

Long, weary day.

Left Næfrholt 9.40 A.M. Wind drove away flies. Crossed Rangá and five other streams.

12.10 P.M.—Reached Thjórsá, 2 hours 30 min. of fast riding—five miles per hour. Ferried over at Thjórsárholt. This third of road good.

1.45 P.M.—Remounted; crossed flat land; two Kálfá; east fork big and west fork small. Bad mosses; rounding foul swamps; one furlong of good path to one mile of bad.

3.45 P.M.—Reached (Eastern) Laxá; reported bad ford; found it very good.

4.10 P.M.—Crossed Laxá valley to Sólheimar (sun-home) farm. Rounded fens and crossed morasses. Passed a made tank for washing sheep—rare luxury here. Foul bog of cotton-grass; deep vein along causeway.

5.20 P.M.—Hruni chapel; 4 hours 35 min. from Thjórsá, fast riding. This third of road moderate.

6.45 P.M.—Left Hruni; road to Geysir now very bad; five fast or seven slow hours; took guide ($1), or it would have been worse. Went north; road not on map. Crossed ugly wet swamp to Minni Laxá (lesser salmon-river); ford not bad.

Up divide of Palagonite running north-east to south-west. Rounded and crossed easiest part of another swamp. Causeway. Up another divide showed us valley of Hvítá. West of us smokes of Reykholt, Laugs everywhere. Avoided causeway, because it runs through tún of large farm, Gröf (the pit).

8 P.M.—Changed pack-horses. Ugly swamp and causeway to Hvítá River.

8.20 P.M.—Forded Hvítá stream; the heaviest, but not bad. Up right bank, a wild gorge; guide left us. Through swamps. Entered ugly system of broken ground, rock-walls, earth and stone, faults and dykes.

10 P.M.—Fell into long descent of birch "forest." Long trot. Forded Túngufljót (Tongue, *i.e.*, Mesopotamia or Doab) River.

10.50 P.M.—Reached Geir-hóll farm, then villainous swamp for tired nags. Crossed eastern three branches of the Árbrandsá (upper Túngufljót), all troublesome; and two other foul, flowing fast influents of the right or western bank.

☉ VI. At 12 P.M. reached Geysir.

Total of this day's ride, 12 hours 20 min., at least 50 indirect statute miles; map, 31 direct geographical miles. General direction, south-south-east to north-north-west.

Dew very heavy, yet plague of flies. Sweltering morn. At 9 A.M., thermometer 82° (F.). 9.30 A.M., good sea-breeze from south. Fine day. In evening cold; clouds from east gathering, 9 P.M.; thick at night, threatened rain.

Geysir to Thingvellir.

July 16.

Left Geysir 11 A.M. Passed Laug farm to south-west, and crossed spongy bog and swamp in rivulet-influent of Túngufljót,

passing between Laugarfjall and the outlier. Rounded south end of Laugarfjall.

12 (noon).—Múli (muzzle, maul, mull) farm, one of the best; skirted southern Bjarnarfell, between ugly, black, bare hills and swamp over triangle (Biskupstúngur), formed by Túngufljót and Brúará.

12.20 P.M.—Chapel farm, Uptirhlíð (?); extensive view; sunk road. Two rivulets, second small and boulder-paved. Forest (birch and willow) begins and lasts with interruptions all day. See more wood in one hour than on all south coast.

1 P.M.—Passed to left chapel farm, Úthlíð, at foot of Hraun of same name.

1.40 P.M.—Crossed bridge of Brúará (bridgewater), and entered lands of Laugardalr. Forded a fourth stream. On right, Efstidalr (uppermost dale), at foot of black plateau, ugly, bare, and gashed with many drains. Hognhöfð pyramid to north, rhinoceros head and horn. Left Miðdalr chapel on right, and rounded upper swamp of Apavatn (ape or fool water, from a settler in the ninth century).

3.15 P.M.—Crossed streamlet fed by many drains and trickles; first down, then up bed, sand-bars and islets; must be unfordable below. Rounded Laugarvatn (lake), large farm and hot spring.

4 P.M.—Halted Laugarvatnsvellir; fine pastures. Five hours tolerably fast = 20 indirect statute miles. Good view of Hekla. Saw two snow-fonds, up which we had walked.

5.20 P.M.—Left Laugarvatn by made road on "barmr" (edge) of low rolling ground and humus, confining big swamp on north; Bjarnarfell hill to right, then three peaks of Kálfstindar. Travellers and caravans.

6 P.M.—Entered old lava. Path rose to 600 feet, and showed Thingvellir Lake. Grim hill, Reyðarbarmr (red, *i.e.*, salmon-trout edge), to right. Road rutty. Dimon or Tindhruni (Bryson's Tintron), an extinct crater in shield form, rising at base of high hill on right.

7.30 P.M.—Gjábakki farm, close to Vellankatla (boiling kettle), north-eastern bay of lake (proper name of boiling well; Cleasby supposes it sank below water-level), along lake.

8.15 P.M.—Hrafnagjá; eastern crevasse.

9.15 P.M.—Middle crevasse, called Háflagjá, Hólagjá, or Breðnigjá (?).

⊙ VII. 9.30 P.M.—Chapel of Thingvellir.

Second march, 4 hours 10 min. = 20 miles. Total, 40 indirect statute miles; map, 26·5 direct geographical miles.

General direction, north-east and by north to south-west and south.

Glorious morning; cloudless; gentle breeze from north. At 11 A.M., chopped round to south-west. At noon west, blowing dust in face everywhere except on lava. Clouds.[1] Few drops of rain. Presently weather recovered itself. Very fine evening and night.

THINGVELLIR TO REYKJAVIK.

July 17.

3.35 P.M.—Left Thingvellir (paid $2, 3m. 0sk.).

Forded Öxará; up rude basaltic causeway, some ten yards long, a little south of where Öxará escapes into plain—site of Búðir. A few yards down grassy surface of Almannagjá. Up split in western wall. Dreary scene on summit; old lava, grassy and moss grown.

5.40 P.M.—Last sight of Thingvellir Lake, and first view of black buttressed Esja, with gleam of sea. Entered Mosfellsheiði; soil damp, sour, and barren; signs of road-making, and Varðas everywhere. Left to right two ponds, Leiruvogsvatn and Geldingatjörn, latter undrained; skirted east and south base of Grimmansfell (ugly man's fell); to right, steaming spring (Reykjalaug).

7 P.M.—Descent to the far-famed Seljadalr (sallow = willow dale).

7.45 P.M.—Dwarf ravine on left. Its stream finds the Hrafnavatn reservoir of Reykjavik Laxá. Rode down grassy basin; forded stream twenty-five times, fetlock to knee-deep.

8 P.M.—Halted to graze ponies. First march, 4 hours 25 min. = 20 indirect statute miles.

8.45 P.M.—Remounted. Continued Seljaland valley; ponds

on both sides with and without drains. View of Snæfellsjökull. On left porcupine-shaped Helgafell.

Hill and basins. Travellers camped where forage is not paid for. Then inhabited country.

10 P.M.—Causeway and made road to Reykir. Ponies dashed through two branches of Laxá.

⊙ VIII. 11.30 P.M.—Reykjavik. Home.

Second march, 3 hours = 15 indirect statute miles. Total, 8 hours = 35 miles; map, 24 direct geographical miles.

General direction, east and by north to west and by south.

Weather fine and clear like yesterday. Sun now sets at 10 P.M., and air grows cold. Find people strolling at midnight. Dust in Reykjavik very bad.

EXPENSES OF TRIP FOR TWO TRAVELLERS.

Guide (10 days at $2, 3m. 0sk.),	$25	0	0
Boy (10 days at $1, 3m. 0sk.),	15	0	0
Returning horses to owners,	4	3	0
Hire of pack-saddles and boxes,	7	0	0
Twelve horses (at $1 per diem),	120	0	0
Total,	$171	3	0

The extras and minor expenses, $27, 2m. 0sk.

Share of each traveller, $104, 2m. 8sk., or £12 for ten days.

CHAPTER XII.

ON HUMAN AND OTHER REMAINS FROM ICELAND.

SHORTLY after my return to England the following letter was sent to the Anthropological Institute:

"I have the pleasure to forward a small collection of human remains and other articles from Iceland.

"The site of the 'find' will readily be found upon the four-sheet map of Gunnlaugsson and Olsen. Cast the eye eastward of the great southern stream 'Markarfljót,' mark or forest flood, whose eastern delta-arm debouches nearly opposite to Vestmannaeyjar, Islands of the Irishmen. You will see on the left (east) of the stream the little valley of Thórsmörk, the grove of Thor, a good sturdy old god, whose name still lives and thrives in Iceland. He was even preferred to Odin, 'Hin Almattki Áss,' 'that Almighty Áss,' by the people of Snowland, and in more modern days he was invoked when a doughty deed was about to be done; the deities of Christianity being preferred only when the more feminine qualities of mildness and mercy were to be displayed.

"The valley in question is described by the 'Oxonian in Iceland' as a 'beautiful green-wooded spot,' near which flows the Markarfljót. About eight miles long, with precipitous sides, its site is bisected by a narrow but tolerably deep 'boulder-river,' a bugbear, by-the-by, of Icelandic travel, and this must be repeatedly forded. The map shows a green patch; the shrubs may average six feet, whilst one monster, a rowan or mountain ash, attains the abnormal altitude of thirty to thirty-six feet. It is one of the tallest, if not the tallest, in the island; the two 'giant trees' of Akureyri, which every traveller is in duty bound to admire, do not exceed twenty-five feet.

"Reaching, on July 16, 1872, Thingvellir (Dingwall or Thingwall), after a Cockney tour to Hekla and the Geysir, I met a young Englishman who was returning from a sketching expedition round the now rarely visited south coast. From Hekla I might easily have made Thórsmörk in a day, but the depôt of bones was then unknown to me. Mr W—— had travelled from the Eyvindarholt farm, west-south-west of the site of the find, in some six hours of fast work, and complained much of the road. There are only two guides, and the half-dozen influents of the Markarfljót were judged dangerous. It is only fair, however, to state that he had read the 'Oxonian in Iceland,' and he was prepared to ford the terrible torrents, nearly three feet deep! in boots and 'buff.' After passing the sites of many fine farms, now destroyed by the ever-increasing ice, he entered the valley from Eyvindarholt by a rugged entrance, leaving the bone-heap about half-way, and to the right of his track. The remains lie under a cliff, where much rocky matter has fallen; above it is the ice-snout projected by the great glaciers and *névés*, Merk-Jökull and Godaland's Jökull, which rise to the north-east and south-west, whilst the rest of the valley, where eternal winter has not overwhelmed the woods, is the usual Icelandic green, vivid and metallic.

"The heaps evidently consist of

> "'The bones of men
> In some forgotten battle slain,
> Bleached by the drifting wind and rain.'

Social traditions assign them to the troublous times of 'Burnt Njál.' This must be expected in these parts of Iceland; several of the remains, however, are described as those of infants.

"From Bjarni Finnbogason, who, as a 'youth of extreme usefulness,' had accompanied Mr Shepherd, and who, developed to a prodigious rascal, had undertaken Mr W——, I took the cranial fragments marked A and B. Arrived at Reykjavik, he agreed for 27 rixdollars (say £3) to ride back and bring me as many skulls as could be found or dug up. After attempting in vain—he had taken earnest money—to throw me over in favour of another party of travellers, he set out on Saturday, July 20th.

He was not to return till the next Friday evening, but, wishing to secure other victims, he came back on Thursday, too soon for any good results. Moreover, he charged me for doing nothing 32 instead of 27 rixdollars, which extortionate demand was satisfied rather than run the risk of men saying that an Englishman had shirked payment. I have the pleasure, despite sundry certificates obtained from various innocents, his dupes, to give him the very worst of characters, and strongly to warn future travellers in Iceland against him. He was familiar as the lower order of Hebrew; he would listen to every conversation; he haunted his master like a Syrian dragoman; he intrigued and abused all other guides; and as for his English, he understood 'a whip with a thong ten feet long' to mean 'a pony ten years old.' The guides at Reykjavik are not worse than the generality of their craft, *pace* Baring-Gould; some are better; but Mister Bjarni—he is generally called by his English employers Blarney and Barney—is a bad lot, who knows well how to *pelare la quaglia senza farla gridare.*

"The following are the principal items herewith forwarded:

3 fragments of thighbones;
1 large hone, 3 smaller;
1 parcel of sundries;
1 broken spindle (?) steatite (?).

"The hones, of which there is an interesting collection in the young museum of Reykjavik, are interesting. The old world Icelanders, as Uno Von Troil, as may be seen in the Rigsthulu, informs us, ever held it a 'noble art to understand well how to sharpen the instruments of death.'

"Richard F. Burton."

The following paper was read by the author:

"Notes *on* Human Remains *brought from Iceland by Captain Burton.* By C. Carter Blake, Doct. Sci., M.A.I., Lecturer on Comparative Anatomy and Zoology at Westminster Hospital.

"The remains which Captain Burton has brought from Iceland are composed of fragmentary evidences of man, hog, ox, and horse.

"I. MAN.

"There are five races of man with whom any remains which may be found in Iceland may be compared with a view to their identification—the Norwegian, Skrælling or Esquimaux, Irish, Lappish, and Russian. I shall briefly pass over the chief characters of these races, and as the Norwegian is the race which forms the majority of the Icelandic population at the present time, I shall commence with it.

"The late Dr James Hunt, during his tour in Norway, collected an enormous amount of statistical facts with regard to the cranial measurements of the Norwegians, which were verbally communicated to the British Association for the Advancement of Science at Birmingham.

"The publication of the memoir containing them was postponed at the wish of the author, and I am consequently only able to refer to my own rough notes, taken at a time when I examined the manuscript of my lamented friend. The general results seem to have been that the Norwegian skull, excluding from consideration all persons apparently of Lappish descent, was excessively short and round, that cases of brachistocephaly were frequent, and that cases even of hyperbrachistocephaly were to be found. The district investigated by Dr Hunt was chiefly to the north of Drontheim, and especially the neighbourhood of Hammerfest. The Swedish skull, on the other hand, appears to be dolichocephalic to a degree; while the researches of Dr Beddoe on the head forms of the Danes indicate a population whose cranial index oscillates from 85·9 to 75·3.

"The cranial characters of the Esquimaux, Irish, Lappish, and Russian races have been so often described, that I pass over the minute comparison, and proceed at once to the evidences on the table. These consist of the following specimens:

"1. Fragmentary calvaria of adult human individual. The contour of the skull has been brachycephalic, though its measurement is precluded by the fact that the left parietal, which alone exists, has been broken off from the frontal bone. The frontal region is bombate. Moderate superciliaries overhang a shallow supernasal notch. The nasal bones extend forwardly, and have not the slightest approach to the form presented by the Esqui-

maux, and in the 'Turanian' skulls described by Dr Pruner Bey. The superorbital foramina are converted into notches on both sides. A small piece of the alisphenoid bone exists, attached to the right frontal, indicating that there was a normal spheno-parietal suture. The dentitions and seriations in the coronal suture have been deep. The parietal bone of large size accords with the frontal in all essential characters of these sutures.

"The occipital bone is in a very fragmentary condition. It is not marked with any prominent ridges for the attachment of muscles, a fact which, coupled with the small development of the mastoid processes, leads the observer to consider that the present skull has belonged to a female.

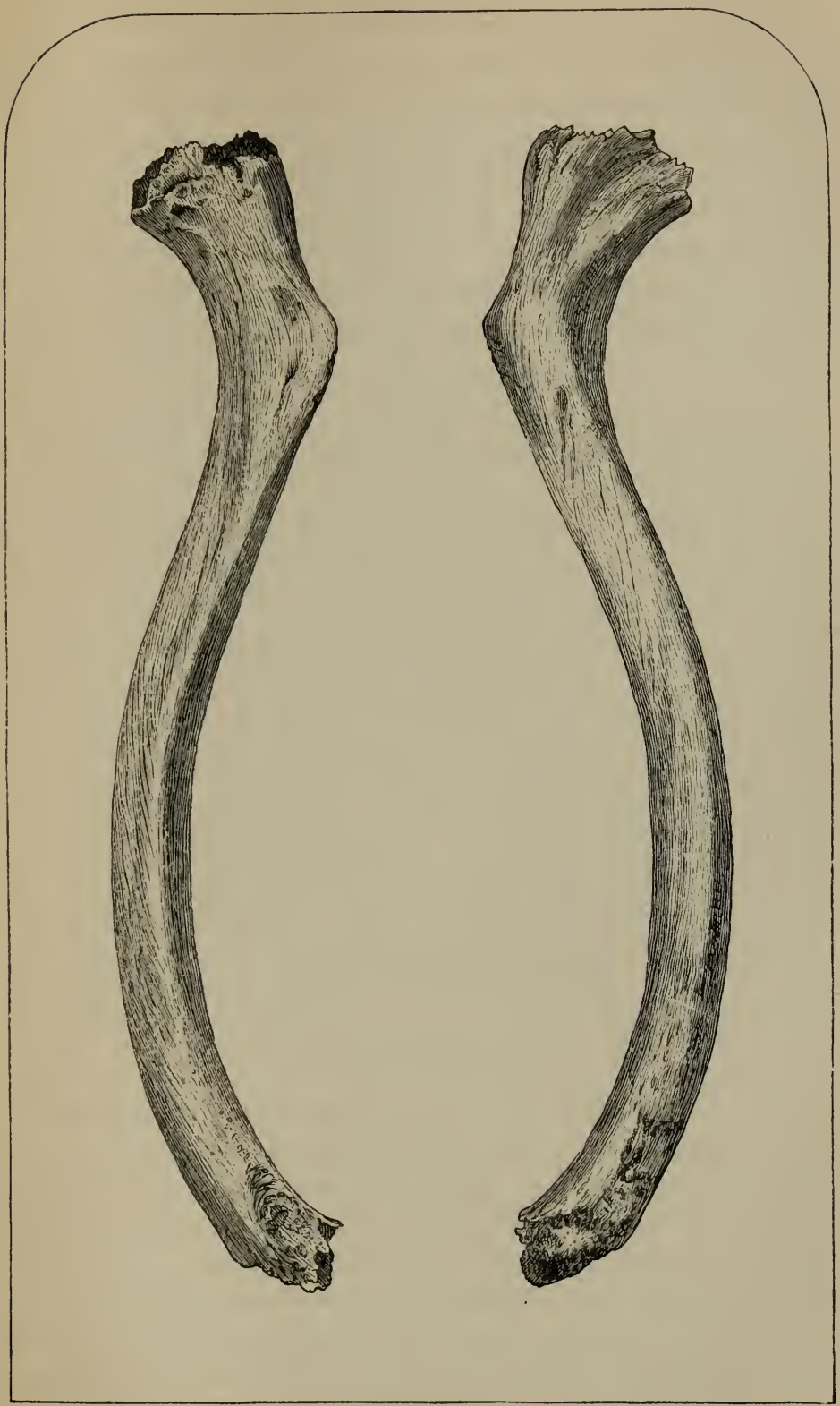
"Three petrous bones, with fragmentary mastoid processes attached, exist in the collection. The smaller size and parial relationship of two of these render it probable that they belonged to one individual, and that the same whose cranial vault has just been described. One large, light, petrous bone appertains to an individual of much larger size, possibly masculine, but I regret that no other specimens are found of this interesting person.

"A fractured palate, with two teeth *in situ* (the first and second molars), leaves evidence highly conclusive as to the food of the inhabitants of Thórsmörk. The crowns of the molars are much attrited by the consumption of hard substances, and are in the same condition as is presented by the teeth of the neighbouring but different race of Skrællings. The first and second molars are both implanted by three fangs.

"The right clavicle (pl. xix.), which is found with both extremities broken away, indicates an individual smaller in size, and with lighter and more slender clavicles, than the Australian drawn by Owen in 'Trans. Zool. Soc.,' vol. v., plate ii., figure 4, and of course more so than in the European drawn in figure 2 of the same plate. Three long and slender femora, a right first rib, a large axis vertebra, a fragment of shattered humerus, and a cuneiform carpal bone are found in the collection.

"II. HOG.

"The remains consist entirely of fragmentary limb bones, and of a few teeth. These need not be noticed in detail.



HUMAN CLAVICLE.

"III. HORSE.

"The equine remains from Thórsmörk are interesting. The first molar and the fourth premolar tooth of the lower jaw, as well as the third deciduous molar of another individual, indicate the existence of a horse of ordinary dimensions, as large as the ordinary European horse of the present day, and larger than the Shetland or Dartmoor ponies. There are few points of resemblance between these teeth and those of the *Equus spelæus* figured by Owen ('Philosophical Transactions,' 1869, plate 57).

"IV. OX.

"Teeth of the *Bos taurus* are present, though in an imperfect condition.

"From the above remarks it will be, I believe, clear that the skulls now described belong to the Norwegian race, though possibly there may be an admixture of Celtic blood derived from the descendants of the Irish prisoners brought into Iceland by the Norsemen. But in no sense can these be termed any Esquimaux or 'Boreal' affinities. That prior to the year A.D. 860, when the expedition of Naddod to 'Snæland' brought Iceland face to face with Norwegian civilisation, a more ancient race, allied to the Esquimaux, may have existed in Iceland, is a possible speculation, but one of which as yet we possess no anthropological proofs. The domestic fauna which exists in Iceland appears to accord for the most part with that of Norway, and the people do not appear to possess any intermixture of Esquimaux blood.

"DISCUSSION.

"Mr MAGNUSSON said—As regards the possibility of an admixture of Esquimaux blood in the Icelandic nation it cannot be maintained on historical grounds. There is no record extant to countenance the supposition that at any time Iceland has been inhabited, wholly or partially, by this polar race. The island lies out of the belt of the Esquimaux, and he would find himself there entirely out of his element, the conditions for the existence of human life in Iceland being entirely different from those on which life in the polar regions depends. The parts of the country

first discovered by the Norwegians contained a few people who had come from England in A.D. 795; and it was first in A.D. 874, or thereabouts, that the first settlers came upon living human beings there. These, however, were not Esquimaux, but Irish Culdees, who had taken up their hermit abode in some of the outlying islands off the south and south-east coast—their solitude being more congenial to the spirit of the anchorite than a residence on the mainland, which meant a more energetic fight with nature than a residence on the islands. The spirit of priest and pirate being then no more homogeneous than now, the Westmen—as they were called by the invader—were soon destroyed. This is, briefly stated, what we learn about these Westmen from Icelandic sources of history. But from Irish sources we learn more. The Irish monk Dicuil, of the eighth century, has written a book called 'De Mensura orbis Terræ,' in which he says that in A.D. 795, he spoke to some Irish hermits having returned from an island in the north, which he calls Ultima Thule, and which, from his description, can be none other than Iceland. It is, therefore, certain that Iceland had been discovered from Great Britain or Ireland some seventy years at the least before ever the Norwegians ever came there. As to the human remains before us, they need be no older than the eleventh century, unless scientific evidence should prove the contrary, for at the beginning of that century, and long afterwards, Thórsmörk, the locality from which they are said to come, was an inhabited countryside. Their real value, I presume, depends entirely on their antiquity; but being no philosopher in matters of this nature, I take leave of the bones and Captain Burton's paper, which has thus far disappointed me that I have learned from it much less than I anticipated.

"Dr CARTER BLAKE agreed with Dr King that no affinities to the Esquimaux were presented by the present specimens. Many Lapp skulls existed in the Continental museums, and some Tschuktchi; but there was great dearth of Esquimaux skulls from Behring's Straits. On the hypothesis that the Aïno skulls exhibited Esquimaux affinities, it was difficult to discuss the question. Dr Rae's observations on the stature of the Esquimaux were certainly interesting. The skeletons in our museums were

short and stout; but how far were they typical examples of the race? The circulation of the queries by the Arctic Exploration Committee would tend to elucidate these questions. With regard to the observations which had fallen from Mr Eirikr Magnússon, he was himself 'agreeably disappointed' that the Institute was not to be converted into a 'hólmgang' wherein to criticise Captain Burton's excellently narrated facts. He failed to perceive what evidence a French or Irish monk could have possessed of Culdees in Iceland in A.D. 795, as Iceland was not discovered (according to Mr Magnússon's statement) till A.D. 874, and according to ordinary chronologists, till A.D. 860. In matters wherein the veracity of a distinguished traveller had been attacked, it was necessary that the utmost care should be taken respecting facts and dates. Captain Burton in no part of his paper assigned a high antiquity to the bones, which may either belong to the time of Burnt Njál, or to a far more recent period."

CHAPTER XIII.

TO EASTERN ICELAND—WE REACH MÝ-VATN.

SECTION I.—THE VOYAGE TO BERUFJÖRÐ.

TRAVELLING seawards from western to eastern Iceland is by no means so easy as the converse. I held myself lucky, though somewhat late, in finding the Postdampskibet "Diana" bound for Berufjörð. She left the capital betimes on a normal Icelandic summer day (July 27); windless or sea-breezy below, while high in ether a tangled web of white threads and comet-like cirri showed the usual upper gale, the ἄνεμοι δύο of these regions. The straw-yellow sun-gleams cast upon the south-western shore enabled our learned glances to distinguish the features of the scenery, a now familiar scene.

About noon we ran along the great lava-field of rough slag and deep, loose volcanic ashes, bearing here and there a tuft of wild oats; the surface was fissured with Geos, and the sharp broken and splintery edges were reddened by fire, and whitened by birds. This corner was seldom visited by the older travellers; Mackenzie reached only Grindavík, and even Henderson neglected Reykjanes. It was carefully examined by Dr Hjaltalín, first in 1827, after the submarine eruption to the south-west, which floated a quantity of pumice, and again in 1866, to examine the silica diggings. He found several Makkalubers, or mud-puffs, and Hverar (hot springs), the north-easternmost called Gunna. A little to the north, a solfatara, extending over an acre or so of bald red bolus, was blowing off steam from cracks and holes, whilst to the south-east rose a large extinct vent which had discharged abundantly north-north-westward. This was the "New Geysir," concerning which I had endured

plentiful "chaff;" for instance, the lines addressed to me by a charming person, and beginning with—

"So there is a new Guy, sir, in Iceland."

The silica mounds, which are now partly, if not wholly, English property, lie near the largest of the mud-puffs, a common caldron, some fifty feet in breadth by half that depth, spluttering thick blue-grey mire, and wasting sulphurous steam. The mineral is remarkably pure; its whiteness suggests that it has been deposited by water, though how and when no one pretends to say; and its laminations are easily reduced to fine powder. It would doubtless sell well in the home markets, but at present there are two objections to it; the quantity does not appear sufficient to justify heavy works, and without these, transport is simply impossible.

To starboard, we had a fine view of the Fuglasker (fowl or gull skerries), which the fog had hid from us in June, and which, like the Canaries, are seldom all visible at the same time. The nearest, about eight miles from Reykjanes, is Eldey (fire eyot), also called the Mjöl-sekkr, from its likeness to a "monstrous half-filled bag of flour;" Scotchmen compare it with Ailsa Craig, and Scoto-Scandinavians with the Holm of Noss. Its shape is that of a tree-stump 200 feet high, cut with a slope dipping north-west, and yellowish-white with rain-washed guano. The heavy surge swarming up the sides and swirling round its small red appendage, the Eldeyjardrángr, suggested peculiar difficulties of landing. The tumult of the waves is described to be even greater about the rest of these "Kaimenis," the Geirfuglasker, and the tall stack known as Geirfugladrángr, the Danish Grenadeer Huen, or grenadier's cap. The two latter, prolonging the line to south-west and by west, and distant twelve and fifteen miles out to sea, lie far from the course of steamers; landing must be impossible, save on exceptional days, and the climbing is said to be bad as the landing. Lastly, there is the Eldeyjarboði, "boder," or warning-stone, *alias* Blindfuglasker, a sunken rock, where New Isle (Nyöe) rose with the Skaptár[1] eruption

[1] Skapt is a "shaved" stick, haft, shaft, or missile; Skapt-á, the shaft-river = Scot. and Eng. Shafto; and hence, Skaptár-fell (sounded *Skapta-fell*), is the

in 1783, gathered its three craters into one, and presently disappeared in five to thirty fathoms depth. I could learn nothing about the favourite auk-rock, said also to have been submerged in 1801, or of the skerry which Lyell throws up in June 1830.

As we steamed along shore, where the host of white spectres haunting the background contrast so curiously with the fat burgher-like plain, we looked curiously, but in vain, for the Drífanda-foss (spray-driving force), which acts barometer to the Westman Islands, and which travellers describe as if it were the Yosemite, "swinging like a pendulum, and often scattered into air." It is probably a local name for the Seljaland-foss, east of the Markarfljót,[1] under whose arch of waters there is the same pleasant and comfortable passage which distinguishes sections of Niagara and the Giessbach. Beyond it we distinguish the Skógarfoss, where the old colonist, burying his treasure in a kieve, still causes men to sing—

> "Thrasi's box is precious
> Under Skogar's force;
> Whose thither goeth
> Folly hath enough."

The approach to the Vestmannaeyjar about evening time, when a vinous hue masked the grim complexion of these "basaltic ninepins," was more than usually picturesque. We steamed by the twin drongs and the little black dot, Einarsdrángr, and anchored on the north-west. Fortunately for travellers, there is riding-ground here, when the fierce easter makes the Kaupstaðir impracticable. In propitious weather, ships usually round the north-eastern head of Heimaey, and lie off the eastern or true port, which is somewhat defended by Bjarnarey. The Holm-isle, once a fire-mountain, now a habitation for mankind, is the main body, to which a score of outlying rocks and skerries act satellites. Viewed from the west, this couthless mass of columns, pinnacles, and obelisks, becs, prongs, vigrs, stacks, and frow-stacks,[2] resolves itself into a line of three heaps, like the

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Shapfell of Westmoreland (Cleasby), the Icel. "sk" being generally permuted to the softer English "sh."

[1] Baring-Gould places it near Holt, east-north-east of Erlendsey.

[2] The "frow-stack" is a skerry, resembling a woman's skirt. Sir W. Scott

Moela, or Gizzard Island of Brazilian Santos. The eastern side shows a low slip of land connecting two culminations; to the north, Heimaklettr, upon whose tormented slopes, 916 feet high, sheep are grazing; and southwards, Helgafell, a more shapely volcanic cone of cinders and grass—it is the work of the Trolls, famed for truth. A white church and steeple, fronted by black huts, provides for some 400 souls, excellent cliff men, full of fight, and armed with guns against the marauding of foreign fishermen—Frenchmen especially.

After the visit of Mr Syslumaðr, who came with the Danish flag to fetch the Iceland mails, we resumed our course, leaving a nameless shoal and Bjarnarey to starboard, and presently the tall bluff peak of Erlendsey[1] to port. The sun setting in cloud, mist, and rain at the respectable hour of 9.30, we congregate below, and enter upon a critical consideration of the "Diana." The English passengers agree that the "Queen" is more "homely-like," which must console her owners for twenty-three tons of fuel per twenty-four hours; the old Danish craft, much like a gunboat on the West Coast of Africa, with 150 horse-power to drive 300 tons, burns only ten, but, *en revanche*, she seldom exceeds seven knots. Those who converted her to peaceful pursuits built an upper cabin, cut up the deck, and forgot seats on the quarter-deck; this "hurricane deck" acts like a pendulum, and makes her roll in the mildest sea, lively as her namesake, till we almost expect her to "turn turtle." The management is essentially in naval style combined with extreme irregularity of hours; even beds are not allowed in the saloon, whilst there are vacant berths in the dog-holes below, consequently sleep is satisfactory as in the "omnibus" of the P. and O., when running down the Red Sea during midsummer. The cleanliness of the Norwegian is notably absent; two wash-hand basins for sixteen head of passengers, and suspended towels, heap difficulties upon washing and make bathing impossible. The Hofmeister or

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(The Pirate, xxvi.) says the "*Fraw-Stack*," or Maiden Rock, an inaccessible cliff, divided by a narrow gulf from the island of Papa, has on the summit some ruins, concerning which there is a legend similar to that of Danoë. Vigr (a spear, in the Orkneys Veir) describes a sharp-pointed rock.

[1] Erlendr is here a proper name: usually it is an adjective, meaning "foreign" = the Germ. Elendi.

restaurateur, who pays the company for leave to feed the taken-in, is not a praiseworthy institution: I almost prefer the purser-plague. Nor are the Danes famed for cooking; they affect grease and, generally, an amount of carbonaceous matter which would horrify Mr Banting. At seven A.M. there is coffee or tea, appropriately called "tea-water;" we breakfast at nine, dine after Genoa fashion at three, and sup at half-past seven—or thereabouts. All the meals begin with *hors d'œuvres*, pickled oysters, preserved lobsters, and the bulbs which, according to Don Quixote, are fit only for cullions and scullions; there is an abundance of cold meat, salt and fresh, and of sausages which, to the British mind, suggest nothing but trichines and hydatids. As long as kindly Captain Holme ruled the "Diana," we had not much cause to complain; on my return voyage his place was taken by a manner of naval martinet, and it is hard to pay full merchantman's fare for man-of-war's discipline.[1]

The next morning rose tolerably fair, a matter of no small importance to sight-seers, who are here exposed to constant disappointments—a rainy summer's day in Iceland is common as a shower in England. About noon we were abreast of the low black ridge, the southern base of a bay-island, whose name, "Ingólfshöfði," still notes where the first colonist first landed. Over this headland, and due north, rose the culminating point of Iceland, "Öræfa- (pronounced *Oeriva-*) jökull," in the Skaptafells Sýsla, the havenless ice-mountain, so called from the open unsheltered coast of south-eastern Thule.[2] Here the climate, affected by the huge refrigerator, becomes Arctic, and the land somewhat justifies the exaggeration of travellers, who compare Iceland with a "bit of the moon;" the sober Paijkull's "exalted scale of nature" now reads not inapplicable. As Mr Forrester describes "Norway and its Scenery" (1853), this region is an expanse of "savage heights and unfathomable depths," crowned by its shapely white apex, which rose like an atmosphere of clouds—we were never tired of gazing at it. In June the whole

[1] Also the single day's passage from Reykjavik to Berufjörð is $12, or one-third of the full passage to Granton, which takes eight to nine days. The other and far more important complaints against the "Diana" have been noticed before.

[2] From Ör, negative, and Höfn, a haven: as will be seen, the plural Öræfi is also applied to a wilderness.

of the upper half, at least 3000 feet high, had been mantled with snow; now the line had shrunk to 2000; and black points, lava islands, and basalt nubs, which warm exposure or too steep an angle had left uncovered, ran up almost to the summit. On August 25 I noticed no change. The shape from the south appeared a flattened cone, a headless sugar-loaf, with white stripes extending far down the folds; about the waist a fast-moving nimbus, brown and slate coloured, enhanced the virgin ermine of the garb. Farther east we saw a long congealed wall built on a meridian, crested about midway by the peaky Hvannadalshnúkr, and buttressed southwards by two parallel points, the hnappar or knobs. Inland the Klofajökull was wholly concealed from view; seawards the semicircle at its base showed every variety of Icelandic eccentricity, the coffin, the sugar-loaf, the horn, the crescent: the expanse of snow-falls and ice-ridges, streaked with *couloirs* and gullies, ends in glaciers and hanging glaciers, the first we had seen on the island,

"Projecting huge and horrid o'er the surge."

The Breiðamerkr, rolling down towards the ocean, kept up by pressure from behind, and showing the usual glorious tints of sapphire-blue and emerald-green, was a model to its kind.

About sunset the scene again shifted. A false shore of lagoon and sand-strips, varying from a mile to a hundred yards in breadth, is broken by a headland, the giants of Vestrahorn—Whydah and Jan Mayen side by side. To the north lies Papós, pope's or priest's oyce, the mouth of Papafjörð, which in the Brazil would be called a *mar pequeno*, fed by drainage from the highlands, meeting the ocean-tide. This unsafe anchorage is the only riding ground for ships along the southern and south-eastern coast, between Eyrarbakki and Djúpivogr. Formerly the peasantry had a week's journey to the comptoir of Berufjörð, but in 1862-63 Hr Jonssen, a Dane, established a trading station. Beyond Papós rises the five-crested top of the Eystrahorn ridge, a wild and savage spectacle which, being gradually wrapped in a winding-sheet of vapour solid as an ice-fog, ended the glories of the day. Our fellow-passengers wished us Berufjörðians *bon voyage*—we were to reach our destination at dawn.

But the kindly hope came too soon. July 19 opened with one of those calm and clammy "Scotch mists," for which all this part of the coast is infamous as Newfoundland, and no wonder, when it lies to leeward of a Jökull-land, covering some 3000 square miles. "Diana" was bound to wait forty-eight hours before she carried us away southwards, but she did so grumblingly: naval officers in Denmark, as in England, may be deterred by undue blame from undertaking the least possible responsibility. Indeed a protest has been proposed against even visiting Berufjörð. Although we saw the loom of the land, we did the very worst thing we could do, steaming slowly to and fro between the twins Selsker and Papey, where the bottom is foul with hidden rocks. The coast between Berufjörð and its southern neighbour, Hamarsfjörð, the latter so called from its hammer-head of perpendicular cliff, is an infinite complication of small, black islets, useful only to eider-ducks, and a

> "tortuous labyrinth of seas
> That shine around these Arctic Cyclades."

We inquired vainly for the apocryphal Kuggr ("cog," or small fishing-craft) of the maps, Gunnlaugsson's included, which is represented only by a shoaling of some six fathoms. We afterwards saw the little lump of Geirfuglasker or Hvalsbak,[1] distant about twelve miles. It was described to me as a rock forty fathoms long and about the height of a ship's deck, rising from very deep water. Yet it begat the large Enchuysen Island of the Dutch. This modern representation of the Islanda of the Zeni Brothers was perpetuated in Maury's Wind and Current Charts (3d edit., 1849) and in the Enkhuysen Island of Laurie (1862), who cut off 120 miles (= 2°) from the eastern coast of Iceland. It is a worse case than in olden Ireland, where "the sly surveyors stole a shire."

It is interesting to observe how the country has retained the names of the Papar. These white-robed "anchorites," as they are generally called, must first have settled in the island (Papey), and the Ystoria Norwegiæ tells us, "Adhuc quædam insula Papey

[1] In the Færoes the whale is written "Qual," a pronunciation still retained in Iceland.

ab illis denominatur." They then took courage to explore the coast lying south-west, entered the Papafjörð by the Papós and, passing towards the warm Auster, founded the monastery of Kirkjubær, on the Skaptárós, not far from the point where, in after-ages, Hjörleif landed. We must therefore differ from a modern writer (*Edinburgh Review*, viii., note, p. 243) who says, "It appears that some wrong-headed monks, either by stress of weather, or by design (for the perfection of religion was supposed to consist in rendering themselves useless by withdrawing from society), had actually sailed to Iceland where they settled, it being most probable impossible for them to find their way back again." The Papar were no castaways; they kept up, as Dicuil has shown, connection with the mother country; and the Landnámabók, at the end of the Prologus, mentioning both Papey and Papýli or Pappýli (*i.e.*, Paparbýli or *pagus*), says, "It is related in English books that men fared often from one land to the other."

Another interesting remark is that whatever way we approach Iceland from Europe, south-east, south, or south-west, we find some islet or needle named Geirfugl, and this connected with the "Gare"-fowl (*Alca impennis*, Linn.), an ancient and almost forgotten term for the great auk, revived by Messrs Wolley and Newton.[1] This northern "Roc," Dodo, or Moa (*Dinornis gigantea*),[2] is sketched by Paijkull in the shape of a three-foot penguin; and according to Professor Steenstrŭp, supported by Mr Newton, it was confined to the Polar regions, or, indeed, to the far north. The Icelanders believe it to be blind (*Blind*-fuglasker), an opinion not shared by the Norwegians and the Færoese. Mr Newton advised me, in case of success, not to follow the usual system of skinning the birds, and blowing the eggs, but to treat the former with pyroligneous acid, which mummifies the

[1] Mr Newton's valuable paper in the *Ibis*, containing all that is required *quâ* Iceland ornithology, has been alluded to. He quotes the works of the late Hr Petur Sturitz, of Professor Steenstrŭp (Videnskabelige Meddellser for Aaret 1855), of the venerable Richard Owen (Paleontology, 2d edit., 1861, and Trans. Zool. Soc., June 14, 1864), and of many other writers. An interesting note about the "only wingless, or rather flightless, species of the northern hemisphere," and two recorded instances of the *rara avis* being kept in confinement, are given by Baring-Gould, Appendix A., pp. 406, 407.

[2] My companion, Mr Chapman, a New Zealander, who has returned to New Zealand, suggested that, despite Dr Hector, the Moa, a bird eight feet high, may still be found alive in some of the forest fastnesses of his native island.

meat, and to preserve the latter in spirits after being coated with paraffin or stearine: thus they would be useful for embryological and other investigations.

The unwieldy bird, common till 1834, was killed off for its meat and feathers, and the last eggs were taken from Eldey (the meal-sack) and the Geirfugladrángr in 1844. Mr Newton suggested a visit to these needles, and Mr R. Buist kindly directed the "Queen" to touch at them; but the weather made a visit impossible. He also advised an exploration of the Geirfuglasker, the south-westernmost skerries of the Vestmannaeyjar archipelago, and others spoke of the Geirfuglasker or Hvalsbak, east of Berufjörð. But the old Icelandic fiery spirit of adventure, all but burnt out under normal circumstances, flames high when the fuel of rixdollars is liberally applied. Geir Zoega of Reykjavik assured me that the Eldey and the Auk-Needle off Reykjanes had been repeatedly visited by fishermen since 1844, the date of the last find;[1] and, though Hr Grímr Thomsen of Bessastaðir "begged to differ in opinion," the destruction of the bird during the last twenty years proves that the people have been in the habit of hunting it. Of the Hvalsbak I was told that though auks may have been seen there, the breach of the sea would have prevented their nesting and breeding. Remains only the Gare-fowl-skerry of the Irishmen's Isles, and I am not sanguine that exploration will yield favourable results.

The fog from the west and south-west, which enwraps this firth when the northern Fjörðs are quite clear, began to break at eight A.M., and before eleven it had lifted sufficiently to show the beacon and the one big house perched upon the basaltic knob of Papey. There is a report that this feature and the islets around it are gradually rising, and that a sensible difference is observed every thirty years. Gradually to starboard the lower folds of Strandafjöll, stepped like the Esja and Skarðsheiði, and farther off the black curtain of Búlandstindr, frayed at the summit, struggled into sight. It was a most inhospitable-looking region,

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[1] According to Barnard, the last European auk was killed in 1848, at Vardö, a Norwegian fortress on the frontier of Russia.

"a coast of dreariest continent,
In many a shapeless promontory rent."

Shortly after noon passing Jón's Holmr and beyond it the Long Tongue, forming the eastern entrance, we anchored in thirteen fathoms water off Djúpivogr (deep voe), a baylet in the southern jaw of the great eastern firth, Berufjörð.[1]

Section II.—At Djúpivogr.

I parted regretfully with Mr Chapman, who had no longer anything to detain him in Iceland, and landed in company with four Englishmen. Mr Askam, with a fine persistency which hails from Yorkshire, would have probably tried to swim ashore had "Diana" shown the white feather. Mr Alfred G. Lock, the concessionist of the north-eastern sulphur mines, his son Charles, and a friend, Mr Pow, of Penicuick, lately from the Argentine Republic, were equally pleased with the unexpected favours of the fog. The former easily persuaded me to join him as far as the Mý-vatn, with the hopes of pushing southwards over the Ódáða Hraun to the unexplored Vatnajökull.

A few preliminary words concerning the mysterious formation along whose southern line we have coasted, and whose northern frontier we shall presently visit. The map shows a huge white blot, labelled Vatnajökull eða Klofajökull, and little distinction is made by the people. The former, signifying water or lake glacier, is so called because *avalasses* of fluid are at times discharged—a phenomenon generally attributed to the bursting of reservoirs through the frozen edges, which are higher than the

[1] Berufjörð is derived from Berr, of whom more presently, or from Bera, a she-bear, the animal being often floated over upon ice-floes: Bare Firth, from "berr," bare, which has been proposed (Longman, p. 33), is a mere error. It is the longest, if not the largest, feature of this coast, except Reyðarfjörð, which lies to the north, separated by three minor inlets. The "look-out" stands, according to nautical charts, in N. lat. 64° 39′ 45″, and W. long. (G.) 14° 14′ 15″ (in Olsen 14° 19′ 47″), the latter supposed to require correction. The difference of time from Reykjavik is about 30′. The variation (west) diminishes: it was laid down at 39° or 40°, but on May 18, 1872, Captain Tvede made it 35° 15′. Here local attractions, often causing a difference of half-a-point within a few hundred yards, would puzzle "George Graham of London."

interior: perhaps the snow and ice may be melted by volcanic eruptions. Klofajökull would mean the crevasse glacier, and its nature is said to justify the name. The total area, 3000 square geographical miles (115 by 60, according to Baring-Gould), has been reduced by Dr Lauder Lindsay, utterly without reason, to 400. The volcano hidden within the white depths is placed, by the best authority, Síra Sigurðr Gunnarson, on the north-eastern mid-arc of the Skaptárjökull (N. lat. 64° 17′ to 20′, and W. long. 30° 20′). Its smoke has been seen at Úthlið, south-west of the Geysir, and the people of Berufjörð attribute to it the fog and ash-mist which prevailed between August 18 and 24 of 1872.

Mr James Bryce says of the Vatnajökull, "One tremendous mass, out of which the highest peaks of the island rise, has never been crossed, and never will." I see no reason to admit him even among the minor prophets. In early days attempts were made to penetrate from the north. The Landnámabók (part iii., pp. 257, 258) tells us, that Bárðr sun Heyángursbiarnar (Bardus filius Heyangur-Biörnis), who had settled up the Skjálfandafljót (river of shivering or earthquakes ?), hoping to find a milder climate on the southern coast of the island, began to travel in spring, "per *Vonarskardum* (crenam spei) cui postea nomen est *Bardargata* (Semita Bardi); ille postea Fliotshversum occupavit, et Gnupis habitavit, tunc cognomen Gnupa-Bardus (Gnúpa-Bárdr) adeptus est." Bárðdalr is still known upon the middle course of the Skjálfandafljót, and Fljótshverfi (flood-village) lies east of the Blængr cone. Thus the old man crossed from north to south, along the western skirts of the Vatna- and Klofa- jökulls. The northern counterscarp was visited early in the present century by a party of Danish officers, who, in the attempt, lost a number of ponies through cold and hunger. In July to August 1838, Professor Gunnlaugsson, accompanied by Síra Sigurðr Gunnarson, travelled along the Vatnajökullsvegr, which subtends the north-west, passed the Kistufell, where the west Jökulsá rises, during the night, or when a fog hid it; crossed the upper waters of that river, and struck the Brú (bridge) on the eastern "glacier-river" of the same name. Hr Guðmundsson, of Reykjavik, subsequently visited the Blængr cone, an extinct volcano at the head of the Skaptá-Kuði valley,

to the south-west of the Klofajökull. He advised me to travel inland from Hekla, leaving the Skælíngar (scowling) peaks to the left or north; to rest at the fine Búland farm; to cross the Skaptá, and to attack the glacier from the Blængr, where the approach is easy, and whence he saw neither lakes nor crevasses. I also heard of another attempt to penetrate from the Skeiðará valley, which lies west of the Öræfajökull; it failed, but no further details were procurable.

In the summer of 1871, a stout-hearted attempt to penetrate from the south was made by a young law student, Mr Watts, of the Middle Temple,[1] who, accompanied by Mr Milne, reached the large patch of forest called in the map "Núpstaðarskógr." Hence he made for a crooked cone lying west of a black rock, but he was compelled to beat a retreat. No Icelander would be persuaded to risk life or limb. The travellers had no snow shoes to prevent their sinking thigh-deep at every step, and, having neglected ladders, they were obliged to throw their packs across, and to leap the numerous little crevasses; moreover, the intense cold robbed them of sleep. After his return, he described the Vatnajökull as "at once a volcano and glacial region of immense extent, within which there is reason to believe that many active craters (?) are included. Vast streams of lava, of a magnitude unparalleled elsewhere (?), have issued from it, both in pre-historic and in historic times. Surmises of the vaguest character have been formed respecting the interior, which may possibly include fertile valleys, the resort of the reindeer for winter quarters (?). It is encompassed on all sides, as far as the traveller could judge, by a desert formed by the action of the sea, huge lava-streams, and fragmentary ejectments, and *detritus* brought down by the flooded rivers incidental to volcanic eruptions. The south base of the mountain is composed of repeated layers of basalt, over-

[1] Mr Watts, who is now publishing an account of his march, and who has started a third time for the Vatnajökull, gave me this list of stations:

1. Reykjavik to Reykir.
2. To near the Tindafjallajökull, south of Hekla; very rough path.
3. Over the deep Mælifellssandr to east, where the valleys are grassy.
4. To the Búland farm.
5. To Kirkjubær cloister, on the Skaptá.
6. To the Núpstaðr farm, a long day's march. Here provisions and forage are procurable.

lying the older tufas (Palagonite?), over which many lava-streams had flowed at various times, while beyond this, apparently, lies a huge glacier, through which many extinct as well as active volcanic vents have penetrated."

Mr Watts has twice renewed his attempt (1874 and 1875), and his stout heart deserves, if it cannot command, success. He strongly advised me to avoid the Berufjörð line, and there, I think, he was wrong. The Journal will enter into details; suffice it here to say that there are two roads perfectly practicable. One which we did not visit ascends the Fossárdalr and strikes the Axavatn (axe-water) and Líkárvatn (lyke-water lake?), tarns which many Icelanders have visited: thence the traveller would ford or boat over the upper waters of the Fljótsdalr and the little Jökulsá, which latter leads directly into the north-eastern Vatnajökull. The other, *viâ* the Lagarfljót, will be described in the following pages. Both offer the great advantages of saving a week's hard travel to man and beast, of sparing supplies, and of offering a choice of places where depôts can be established.

We found three dwarf landing-piers at Djúpivogr; and that to the east, with its double tramway, was a queer contrast with the popular anchor, four upright cask staves, and two below, containing rough blocks of basalt. A hospitable reception awaited us from Hr N. P. E. Weywadt, the principal agent for the comptoir, and his brother Captain H. R. Tvede, both Danes: the latter has travelled far and wide, he has served in the United States navy, and his abundant information is freely retailed. The former occupies the block of building, tarred wood as usual, to the west of the baylet, containing the dwelling-house and sundry stores. The windmill, little bigger than a man, a common labour-saver in these regions, is rudeness personified. The toy sails of sacking work a perpendicular cog acting upon a horizontal wheel, whose square iron spindle turns the stone: the rye is placed in the hopper or upper case provided with a shoot; the damsel is a nail worked by the spindle, and, as there is no vent in the bucket, the flour must be baled out with the hand. The stones are taken from the quern, and indeed larger sizes are not wanted. These primitive articles make better meal than the

mouldy imported flour. Finally, the "wind-house" crowns an adjoining nub of basalt. Facing it is the boiling establishment, a large wooden shed like an Iceland church, containing thirteen vats, an iron pan, and a smithy in a detached hovel. On the hill behind is the "look-out," which becomes important when steamers are expected. South, or at the bottom of the baylet, lie two double-storied black houses, with white windows, Captain Tvede's stores: we were comfortably lodged in the upper floor. The climate here is exceptionally genial, less severe in fact than that of Scotland. The north wind is cold and clear, the south wet and warm, the east raw and clammy, and the west mild and muggy. It is reported that an observatory will be established at Djúpivogr. Little farms, provided with nets against sheep, are scattered all around, and Hr Weywadt rents a large tract of ground which we shall pass going up the firth.

I spent some days at the mouth of the Berufjörð, coming and going, and had a good opportunity of studying the whale fishery. A company was established by Captain Hammar, a Danish officer, who afterwards went to Russia with the object of teaching the use of strychnine and curari—here the people opposed him as much as possible, declaring that the flesh, which is poisonous only about the wound, would kill men and dogs.[1] The chief objection is that the animal sinks, and does not rise till some two days after death, causing frequent loss. The first year brought in $10,000; the second, $5000; after which the concern was sold to three capitalists, under whom the shares fell 95 per cent., with a loss of $300,000 to $400,000.

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[1] Mr Tom Roys, an American, accompanied by his four brothers, established himself at Seyðisfjörð, and used a rocket harpoon patented by himself, and so much "improved" that it will hardly leave the gun: the shell explodes in the body, kills the animal instantly, and, by generating gas, causes the carcass to float; if not, the defunct is buoyed and landed at discretion. He first hunted with a small sailing craft, and in 1865, after bagging seven to eight animals, each worth $2000, he brought from England a screw of 40 tons burden to tow his whaling boats. He calculated that 365 whales would allow 1 lb. of food to 68,000 souls every day in the year: he also proposed pressing the meat for feeding dogs and fattening pigs (!). In that year his total bag till August was twenty-five whales, of which he landed thirteen. I was told, however, that the speculation proved a failure, and that Mr Roys went off to Alaska. At Seyðisfjörð, distant two days' march, there was a Dutch steamer, which last year had killed thirteen whales. When reduced to the last extreme, we thought of travelling home in her, but future explorers must not count upon such opportunities.

The Iceland whale fishery, famous during the last century[1] all round the island, ceased about the middle of last century, when better grounds were discovered: the result is that the animals have increased abundantly. The natives declare that there are thirteen species, but of these doubtless some are *Delphini*. The following are the four best known:[2]

1. *Balæna mysticetus*, or "right" whale of Greenland and the South Atlantic; *la baleine franche*, which lacks dorsal fin, is found off the north coast, but was never seen here by living man.

2. *Balænopter a gigas*, or humpback whale, whose fins, despite the name, do not form wings: it is the biggest, averaging seventy to eighty feet; it contains the best and largest quantity of oil, and its colour is whitish, with wrinkled belly.

3. *Balæna physalus*, herring or sulphur whale, containing far less blubber than the preceding.

4. *Balæna rostrata*, the yellow-brown finback, or round-lipped whale, whose forefins are some nine feet in length: it is the smallest, the liveliest, and the most powerful; it frequently ascends the firths, and it is known by throwing the highest jets.

The animals are wild and wary, probably the result of clear water, and do not allow themselves to be approached in steamers: they are harpooned from boats using four to six oars. The latter three being "finners" (*Physalus antiquorum*), do not produce much —fifty barrels would be a fair average. The carcass is cut up on

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[1] Uno Von Troil (129, 130) gives interesting notices of the whale. He divides the mammals into two kinds: (1.) "Skidis-fiskur," or smooth-bellied, with whalebone instead of teeth; the largest, "Stettbakr," or flat-back, measures nearly 200 English feet, and the "Hnufubakr" is only 50 feet shorter. Of the Reydar-fiskur, or wrinkle-bellied (No. 2), the largest is the "Steipereidur," attaining nearly 240 English feet; the "Hrafnreyður" and the "Andanufia;" all are considered very dainty food; and the Icelanders say the flesh has the taste of beef. The whales with teeth are (1.) the eatable, such as the Hnysen, the Hnyðingur, the Hundfiskur, and the Maahyrningr; and (2.) the ice-whale, or uneatable, with its subdivisions, the Roðkammingur and the Náhvalur, were both "forbidden as food by some ancient regulations, and particularly by the Church laws. The Icelanders believe that the first sort are very fond of human flesh, and therefore avoid fishing in such places where they appear." The carnivorous whales were frightened away by carrying "dung, brimstone, juniper-wood, and some other articles of the same nature, in their boats"—an idea worthy of the black tars who navigate Lake Tánganyika.

[2] Professor Paijkull adds the Reyðr (whence Reyðarfjörð), *Physeter* or *Catodon macrocephalus*, a large spermaceti whale; he also gives to the Iceland waters the Arctic walrus (Icel. Rosm-hvalir; *Trichecus rosmarus*), and the narwhal (*Monodon monoceros*). The Sagas specify twenty-five kinds of whales.

the strand; and the fatty matter, after being kept for some three weeks, when it supplies more oil, is boiled down. The belly, which contains no blubber, yields the favourite food, "Rengi:" when fresh this yellow-white layer between the Spik (speck) and the Thersti (flesh) is mistaken by the ignorant for beef and pork, while connoisseurs prefer it to any meat, especially after it has been soaked in vinegar or sour whey. The whalebone is sent to England, where, according to Mr Consul Crowe (loc. cit.), "it appears to be used for making Prussian blue." The oil is employed in tanning: the first boiling, of course, is the clearer, and the second is browner, with more "foot."

Shark-hunting is a popular pastime, here as in "Colymbia," being more profitable to the Icelander than the whale. It is chiefly the *Scymnus microcephalus*, or Greenlander, called by the people Há-karl[1] (pronounced *Hau-kadl*); it may average 18 feet in length, and attain a maximum of 25; the back has two small fins, and the liver, which extends nearly through the whole body, may yield two barrels of oil, each about 140 quarts. It is dangerously voracious; we never hear of accidents to men, for the best reason, they do not bathe; but it tears steaks from the whale's sides, it devours dead reindeer (?), porpoises, seals, and cods, and it does not despise a pair of boots. The *Scymnus* much resembles the sunfish or basking-shark (*Scyllium maximus*), which is caught off western Ireland between May and the end of June; the southern monster, however, ranges from 20 to 50 feet in length, and its dorsal fin stands like a gigantic ploughshare about a yard above water. The ova of the Há-karl, nearly the size of hens' eggs, are produced in July and August, each shark yielding about half a barrel full. The skin is grey, coarse-grained, and incapable of being polished, but it is valued for shoes.

The sense of smell is said to be highly developed in the Há-karl; on the other hand, it is dim of sight as the elephant, the

[1] The Ork. Hockla is the dog-fish, *Squalus acanthius* or *archiarius*. Mr Vice-Consul Crowe gives the names "Nákarla or havkalur," probably misprints; he adds, however, that the Greenland shark rarely attacks man unless molested by him. This assertion, which is made in all popular books, may, I believe, be modified by the reason given in the text. He also tells us that the hide is cheaper than either seal or lamb skin, but is neither strong nor durable—this again I doubt. The Greenland shark is called by some travellers Háskerðingr, and it can swallow, they say, a reindeer.

horny covering of the eye attracting the parasitical whale-louse (*Lærmodipoda, Cyamus,* etc.), which often invest the whole organ. Its vitality is familiar to all who have seen a shark cut up, and tales are told of its swimming round the vessel after being ripped up and losing its liver. This carnivor is caught near the eastern coasts, in 60 to 80 fathoms. On the north it always hugs the land between November and March: in summer it goes out to sea, and it sometimes lies in a depth of 300 fathoms. The usual "sharkers" were half-decked affairs, ranging from 20 to 25 tons, with a crew of six to eight men: they were preferred because heavy grapnels and hawsers are not required; moorings could readily be shifted, and, being low in the water, the prey could be more easily hauled in.

Off late years the craft used on the north side of the island are decked vessels of 35 to 54 tons, provided with oars, and so lightly built that in calm weather they can easily move from place to place, and get clear of the ice. They lie in preference off the rising edge of a bank, the anchor being generally a four-pronged iron grapple, weighing about 180 lbs., with 15 to 20 fathoms of $\frac{9}{16}$-inch. chain-cable, and a 350-fathom hawser. If nothing is caught, the position is shifted until the shark is found; and if the latter is good, the vessel remains at the spot, and rides out the storms. In calm wintry weather the fishermen venture their small boats, and if fortunate they may secure within a couple of days fifteen barrels of liver per crew.

The lines used are thick as our deep-sea log-lines, fastened to three fathoms of chain, weighted in the middle with leads of 10 to 13 lbs. Under this is attached a strong 6-inch iron hook, notched inside to prevent the bait slipping: the latter is generally horsemeat, which has been soaked in blood, or seal-blubber which fetches a mark and more per pound. When hauled up to the surface, the captive is made fast with a rope attached to the craft, and killed with a lance; the belly is ripped up, the liver is stowed away, the gall is preserved for soap, the head is cut off, and the carcass is slung alongside the vessel. "The stench of the dead shark is so intolerable that it cannot be taken on board; but the reason for keeping it is the fear that if the live ones were allowed to glut themselves on their dead comrades,

they would no longer take the bait so readily; for they are so voracious that often only a portion of the shark caught on the hook reaches the surface, the others having partly devoured the wounded monster on his passage upwards. So firm are the fishermen on the west coast in this belief, that they have petitioned the legislature to enforce by law the keeping of the carcasses alongside as long as the fishing lasts. This opinion, however, is not shared by all the shark-fishers, and is open to doubt."

The value of a carcass on shore is about 7s. 6d. A moderate-sized shark gives two-thirds of a barrel of oil, and three barrels of liver yield on an average two barrels; the former each worth between 37s. and 50s., and the latter from 55s. to 125s. The chief markets are Sweden and Germany, where it is largely used for tanneries. The high odour of the comptoirs arises from the liver being kept for some three weeks, under the idea that the supply is increased. The skin is pegged out on the ground to dry, and the flesh, especially of a kind of dog-shark, is sold. The latter is buried for some months above high-water mark; a year is better, and two years make it a delicacy. This *bonne bouche* has a clear, yellow, red colour, with somewhat the appearance of smoked salmon. Indigestible as all sharks' meat, it is peculiarly "staying" food, and a couple of ounces will satisfy a man for the day. According to some travellers (Dillon and others), this "crack-dish" communicates its rankness to the eater, who is unapproachable for three weeks; but I never observed the fact; nor did I find that the prepared flesh was unpleasant to the nose, "its presence in a room being very perceptible." Mr Crowe adds that the peasants often burying it in the ground for two or three weeks, take it up, wash, and cut it in strips, which are hung for a year in the drying house before being considered fit for food. Finally, it is never used here, as in Maskat and Zanzibar, when in the state which may mildly be called "high."

At Djúpivogr we found the usual species of fin. The white fish is caught by long lines laid at night, and hauled in next day. They carry 200 to 300 hooks, but they are miniatures of the giants used by English fishermen in the North Sea, which

are measured by miles. The flounder, the halibut (Heilag-fiski, Helliflynder, *Hippoglossus pinguis*, or holy flounder), and the red-spotted plaice are favourites, despite want of flavour: the dried skate is the bread of this ichthyophagous race, and the fish has passed into a proverb for voracity—"he eats everything that comes in his way like a skate." I heard reports of enormous squids, the skate-whaals of the Shetlands, which may easily have given rise to the "Kraken" tale. Specimens have been seen from Zanzibar to Newfoundland, where cuttle-fish (*Architeuthis monachus* and *A. Dux. Steenstrŭp*) have been found with bodies 15 feet long by 19 inches diameter, and "extensive arms of unknown extent." The "Great Cuttle-fish" is the Dragon of Polynesian mythology (p. 209, The Emigration of Turi), and it pulled down canoes unless killed by the axe. The Calmar de Bouguer, so called from the officer commanding the aviso "Alecton," was attacked in 1861, off north-eastern Tenerife, with bullets and harpoons; this *piuvre* is described as 18 feet long, and beaked like a giant parrot. Moreover, the lumps of rock rising suddenly from the smooths and lines of ripple, viewed through the evening fog, must have kept alive the haunting idea of the kraken. The Great Sea Serpent, or Soe-orm, *alias* Aale last (*Serpens marinus magnus*), appears in the pages of Bishop Pontoppidan as an impossible snake, with crescental coils disposed perpendicularly instead of horizontally. Although Professor Owen determined it to be an otary, the fact is not "proven;" and of late years it was revived as a gigantic saurian which has escaped the general destruction of his race. Similarly there is an immense mass of evidence in favour of the Lind-orm or great land serpent. We find him in Livy, Pliny, and Strabo; and Regulus saw him at Bagrada stretching 100 feet long. That most conscientious traveller, Dr de Lacerda, relates that when voyaging up the Brazilian Tiété, his slaves sat down upon a trunk, which proved to be a snake; and I brought home traditions of his having closed a path to travellers in Eastern Intertropical Africa.

Section III.—To Berufjörð: Up the Firth.

At Djúpivogr we met Hr Oddr V. Gíslason, a "Candidatus Theologiæ," who had visited England, and had published an Icelandic primer (Leidvisír, Reyk., 1863), which he dedicated to a friend, the late Hermann Bicknell. At the capital, where his wife remains, he acts as Lloyd's agent, and in the east he collects ponies and sheep for Mr Askam. His local reputation as a shark-fisher and a *viveur* stands tolerably high, but he can work hard when he pleases. This worthy at once applied himself to buying bât-ponies, and to hiring a guide, whose perfect and well-known uselessness deserves notice.

Gísli Eyriksson is a good-looking man of thirty-five, with blue eyes, aquiline nose, and a full blond beard. Formerly a day labourer, he prefers to be an able-bodied pauper; the sturdy vagrant owns two nags, yet he has thrown his loafing self, his wife, and his three children upon the parish. His only merit is not drinking; and the women pity him because he is pretty. An Ebionite from the womb, a Lazarus with the tastes of Dives, the invertebrate creature is soft as a girl; he dawdles limp as a negro; he malingers, pleading a bad knee to attract compassion; he makes everybody do his duty; he is ever in the kitchen, never at work; he breaks everything he touches; it makes one's fingers tingle to look at him. Presently he will strike for more pay. Meanwhile he is the picture of the Prodigal Son in Iceland garb: his stutt-buxur,[1] the pointed and buttoned overalls, said to have been imported from Scotland by King Magnús Berfætti, are in rags and tatters; his stirrups are knotted cords, and his bridle is a string. Inconsequent as a Somali, he drops his fragmentary Svipa (whip) every hour, and he manages even to lose his knife. We engaged him for 4 marks per diem; the "dog of an Icelander" swore after return that the wage was $1, 3m.; and when he received his $29 he mounted his nag and jogged leisurely home.

[1] Properly short-breeks, or curt-hose, from Stuttr, stunted, stinted, scant (Cleasby).

July 30.

We sent on our ponies, the first detachment, during the thick fog of morning, the warm moist sea-air showing 73° (F.), condensed by the black and white heights; and in mid-afternoon, we set out for Berufjörð in Captain Tvede's whaleboat. It had a centre-board after approved fashion, but no sail to catch the fair wind from the Fjörð-mouth. The crew consisted of two Icelanders, who, accustomed to the silly narrow blade, the "mos majorum," were unable to handle the broad oar; the two coopers, a Dane, and a German who disliked soldiering at home, did much better. As the mist lifted we enjoyed the views upon the firth, which our patriotic captain compared with the Organ Mountains, Rio de Janeiro. Yet there is abundant Icelandic physiognomy in the Fjörð viewed from above, especially when the sun is slightly veiled and the shadow of the mist falls upon the wild forms with a pale, unearthly glare. As a rule, too, there is a distinct circulation, an indrift of lower and an outdrift of upper cloud; the effect of the double winds, so common in maritime Iceland, and very striking to the nephelophile. The rival shores contrast sharply. The northern, especially about the Berunes chapel, has broader flats and more frequent farms, backed by the stepped copings and the buttresses of the Strandafjöll. The trend is to the north-west, where quaint and regular castellations, either rising sheer or based upon *débris* disposed at the natural angle, are divided by deep gaps and fosses. The eastern sky-line is broken into crags which appear a mass of ruins; in places the capping is a single stone, a needle, a column, a Grettis-tak (logan-stone), or an "old man;" here falls a sharp *arête;* there towers a pyramid, which viewed at another angle proves to be a headland. The general form is not unlike those dolomites which Sir Humphrey Davy mistook for granite. A remarkable band of green Palagonite, locally called "petrified clay," dips waterwards at an angle of 37°; it crops out north at Breiðdalsvík, and it is said to be traceable southwards for a two days' march.

The fronting shore begins with a fringe of rocks and skerries; the Fiskenakketange baylet is mistaken at night for Djúpivogr; and the inner and outer Gleðivík (gled-wich), the Indre and Ydre Glæding

of old Danish charts, are especially rich in "rognons of rock." The uplands are formed by masses of trap, with drops and slopes cut and chasmed, at right angles, by gashes and ravines bearing a thin vegetation. We are shown the Teigarhorn (paddock-horn) torrent, about a mile and a half from Djúpivogr; here fine zeolites are, or rather were, found, and Iceland spar is known to exist—unfortunately the farm is Church property. The only important feature is the Búlandstindr, whose north-eastern pyramid, laid down at 3388 feet (Danish), makes an excellent landmark for those coming from the south; the grim black wall bears snow on the northern exposure, and the easily breaking stone renders the ascent unpleasant. At five P.M. we passed the Gautavik (Gothwich) farm, about a century ago the only trading comptoir, dating from the days of Burnt Njál. Some forty-five minutes afterwards we touched at the excellent anchorage of Staulovik, to land Hr Gíslason and a very small boy carrying a very very large jar of rum. Shortly afterwards we opened on the right bank Fossárdalr, which bounds Búlandstindr on the north: here the strata rise waterwards at an angle of 28°. The vale, faintly green, is called Viðidalr in the upper part; it is the directest line *viâ* Keldadalr (well-vale) to Fljótsdalr, immediately east of Snæfell, but there is no bridle-path, and the compass must be the only guide.

The channel was not wholly desert, we met two boats; the sticks planted upon the islet-rocks, the Æðarsker, and the Æðarsteinn, showed it to be an eider-firth, where the intelligent seal well knows that he may not be shot, and where ravens flock in forlorn hopes of a duckling. "Faraóslið" is the folk or cavalry of Pharaoh, for that wicked but debatable king, so great is the might of myth, has colonised even Ultima Thule; and his lieges still become men and women, laying aside their furs, on the eve of St John. They give rise to a multitude of proverbs, *e.g.*, "'Too near the nose,' as the seal said when hit in the eye." Phoca here forms part of the parson's flock. They are tame as porpoises. The cows are never killed, and the young are spared; when a battue of men-seals with gun and club takes place, it is during summer. These mammals are most numerous on the southern and eastern coasts; here in one spot we count fourteen pair of eyes quietly but persistently prospecting us. As the fine is

three marks for firing a gun within a mile, and the flesh is the best possible shark-bait, we are consulted upon the subject of air-canes.[1] "Krummi" (crook-bill), the raven, whose size has been exaggerated by travellers, is everywhere in Iceland an unmitigated pest, and he shows the unbecoming familiarity of the "ghurab" in Somaliland. His impunity may be due to his cousin the corbie's sentiment:

> "Ho, ho, ho! said the old black crow,
> For that nobody will eat him he very well doth know."

Perhaps some survival of old paganism may preserve the "yellow footed bird in the inky cloak," who became black by reason of his sins: Odin's hawk, the "black cousin of the swan," who appeared in the traditional oriflamme of the Norsk Vikings, and who still survives in the lines:

> "Though Huginn's (Mind's) loss I should deplore,
> Yet Muninn's (Memory's) would affect me more."[2]

Hence, possibly, the prevailing superstitions, *e.g.*, that Ralph combines eccentric habits with human intelligence; that he is a bird of augury; that he holds a Hrafna-Thing (council) in autumn, to billet the several couples; that every church has its own pair; that Grip does not plunder the farm nor fight the dogs of those who lodge the Grips; and that he warns the owner of dead sheep. The Raven's Song (Krumma-Kvæði), a dialogue between "Hrafn" and a peasant, is well known, whilst the Hrafna-galdur

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[1] Iceland does wisely to preserve her seals. Argyleshire in the olden time, and especially the holms south of Skye, were famed for them; now they are very wild and not likely to be caught basking on the rocks, or bathing in shallow water. Old bull seals, who may measure 5 feet 6 inches, are wary in the extreme, and seldom allow the use of the club. Phoca must also be hit on the head, or the hunter will see no more of him. In Greenland the packs have been almost killed out by the scores of vessels which Dundee and Peterhead, Norway and Sweden, Denmark and Germany, send every year, and it is reported that without a "close time," the breed will become, like the oyster and the crab, almost extinct. San Francisco has been sensible enough to preserve the flocks of Proteus by the strong arm of the law—I wonder if grim old "Ben Butler" still tries to stare man out of countenance as he floats off the Ocean House.

[2] Mr Blackwall satirically suggests that our Huggins and Muggins may descend from this respectable parentage, whilst he trusts that the Smiths, Smyths, and congeners, "will duly acknowledge the sturdy Scandinavian yeoman, Smiðr Churlsson, grandson of the jovial old fellow, Grandfather, who had the honour of pledging a bumper with a celestial deity, as their common ancestor."

Öðins (Odin's Raven Song) is a miracle of mystery. Ralph's croakings were and still are omens, betokening death when heard in front of a house, and he has appropriated a variety of proverbs. Perhaps this sentiment prevented the Northerner "improving the subject," as did blind Herve in the Breton verse, "When you see a raven fly, think that the Devil is as black and as wicked. When you see a little dove fly, think that your Angel is as sweet and white." Thus after St Vincent was beheaded, all the Grips that alighted upon his corpse fell dead; on the other hand, Ravenna owes her name to the fact that ravens, crows, and jackdaws flocked from every part of Italy to take part in the feast of St Appolinarius. In the Færoes the bird of the "brook Cherith" has lost all his Odinic reputation; he is easily killed when the snow drives him to the farm-house, and four skillings are given for his beak. Perhaps instead of being slaughtered, he might be exported to England, where he would now command seven shillings. According to the people, he is not invincible, being often beaten by the agile sea-pie (*Hæmatopus ostralegus*, the Sceolder of Shetland), and sometimes slain by the strong-billed sea-parrot (puffin).

As we approached the bottom of Berufjörð, we could see the snows over which our path would lie, and the "gurly flood" dashing down the broad steps of trap. It drains the Axarvatn, the "Axe-water," so called from its shape; it is said to be rich in trout and fish, but Mr Pow, who was of the party, found it far too clear and cold. After a pleasant row of twelve miles in about three hours, we reached our destination, and the "new chums" derided the place which appears so large upon the map. Berufjörð is, in fact, nothing but a Prestagarðr (parsonage) and a chapel, the latter distinguished from a stable only by the white cross, episcopally commanded; the doors hang about, and there is a sad want of paint. In Iceland the clergyman often moves off when his church wants repair, for he must pay the expense.

We were courteously and hospitably received by Síra Thorstein Thorarensson, who was busy in his tún superintending the day-labourers. It is the hay-harvest, the only harvest that Iceland knows. The men ride to and from their work, ply their ridiculous scythes, and, besides being fed, are paid per teigr (80 square feet)

1 Fjórðung[1] = 10 lbs. of butter, here worth 2 marks per lb. An active hand at this season can make $2 per diem, 11 marks being the average; many farms are nude of males, and consequently guides in August are scarce and dear. Hay, which fetches 1 mark per 10 lbs. in winter, now sells for $2 the kapall[2] (horseload, or 240 lbs. Danish); and as the ton in Scotland costs at this season only £1, 10s. to £2, 10s., Mr Pow scents a spec. That evening passed in the confusion of sorting goods and sending back all articles not strictly necessary; it was far into the small hours before we could settle ourselves upon the rotten boards, and under the hideous crucifix which, forming the chapel's altar-piece, carefully avoids breaking commandment No. 2.

July 31.

Whilst awaiting the arrival of our carriage, Captain Tvede volunteered a walk up the Berufjarðarskarð, which crosses the northern wall of the firth, and afterwards anastomoses with the road to Thingmúli. This part had not undergone its annual repair, and it was painfully pitted with horse-traps, deep holes. The lower part was an avalanche line:

> "Interdum subitam glacie labente ruinam
> Mons dedit, et trepidis fundamina subruit astris;"

but "interdum" hardly applies to what happens annually from these "thunderbolts of snow." To the right lay Sóta-botn, a huge hollow, probably formed by hydraulic pressure, the sinking of a mountain-stream, a common feature in the Brazil. As Sóti and his wife Bera (the bearess), a name often given to women, were riding home over this pass, their enemies raised a magic fog; he broke his neck by falling into the pit; she broke her head as the famished horse, to whose instinct the rider had trusted, rushed into the stable—the site of the latter is still shown near the parsonage. Bera's cairn lies at the top of a little promontory at the north end of the Fjörð, where her ghost sits gazing upon the

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[1] A fourth; hence our farthing.

[2] Evidently from Caballus, the word which has so successfully ousted the more classical Equus. The Dictionary makes the horseload = 5 trusses; Uno Von Troil, 12 to 15 lispunds, each about 17 Eng. lbs. avoir.

ever restless tide.[1] The picture was diversified by an advance of white mist; its fragments, forming a vanguard like a flock of wild geese, with abundant play and movement presently invested the shallow cupola of Thrándar Jökull, whose brown clouds were its own growth: at times it melted under the sun, and presently it renewed itself in the cold wind of the firth and in the colder breath of the snow-clad summits. Finally, it settled upon the mid-ridge, making the upper half appear miles away from its base.

After a two hours' stroll we reached the Bitruháls, or *col*, which stands over 2000 feet above sea-level.[2] On the left hand rose Kistufell, the apex where the Danish officers placed a landmark: the summit must be at least 1000 feet higher than the pass. Through the reek and dance of the morning air we looked down upon Breiðdalsvík; the Broad Dale is parted into a northern and southern feature by "Möleyri," a great spine of trap, and the nearer section is split by three large perpendicular Gjás. The winding Breiðdalsá, which has a fork for each valley, is clear and limpid, very different from Jökull water; and large farms are scattered everywhere about the soles. The northern face of the Berufjarðarskarð is even more striking than the southern; the "Vandyke cliffs" have all the tints of Brazilian Tauá; nowhere does Iceland show more colouring. The red, pink, dead-white, and pale-green Palagonite follows the torrent-beds and girths the rivers; and the singularity is increased by walls and outcrops of the hardest and blackest hornblende, building dykes, bridging chasms, and causing the snow-streams to breach over in cascades. Farther down there is a vein of glistening trachyte celled with iron, probably a prolongation of the Skriða hills, which we shall pass farther north; afar it looks like plaster

[1] Mr Jón A. Hjaltalín informs me that on the borders of Norway and Sweden several local names are called after Sóti and Bera, and the legend may have been transplanted to Iceland. It is not found in the list of Sagas quoted by the Cleasby-Vigfusson Dictionary: I am therefore inclined to refer it to the sea-rover Hallvarð Sóti, of whom we read, "Thence Kol steered his course out of the river to Norway . . . and came on Hallvarð Sóti unawares, and found him in a loft. He kept them off bravely till they set fire to the house, then he gave himself up, but they slew him, and took there much goods" (Burnt Njál, ii. 2).

[2] The aneroid (compensated) showed 27·63; the thermometer, 67° (F.) in the open air. On the return march, the former was 28·08, and the latter 76° (both in pocket). At sea-level the instruments stood at 30·04 to 30·12, and 63° (F.).

fallen from a wall. The valley is scattered over with chalcedonies and crystals of lime, the produce of geodes washed out of the trap, and with jaspers, especially the red, green, and banded; Hr Gíslason's "copper ore" is probably nothing but burnt or corroded "yaspis." Along the stream-banks grow yellow poppies (*P. nudicaule;* Icel. Mela-Sól), with small lemon-coloured flowers and large spreading roots; they extend to Spitzbergen, and the last time I saw them was in the Desert of the Palmyrene.

Down the northern descent, which is rapid but provided with a good causeway *à tourniquet*, runs the eastern road to Seyðisfjörð, firth of the Seið or *Gadus virens*, the abode of many merchants, distant some sixty miles from Djúpivogr: the western *viâ* the Öxarheiði (ox-heath) is generally preferred because it crosses two instead of three great divides. The line to Thingmúli turns to the left, repeatedly crosses the southern Breiðdalsá, and ascends by another newly built causeway, the Breiðdalsheiði, where there is a nameless lakelet, neglected by the map, which discharges the southern Broad Dale fork.

Section IV.—To the Mý-vatn: The Seven Days' Ride.

July 31 ended with a "sea of troubles." Captain Tvede and Mr Pow left us, greatly to our regret, and no one seemed anxious to effect a departure but ourselves. The guide skulked, the ponies came in slowly, and, worst of all, a dark march was proposed. This always appears to me the *summum malum* of travelling; it is equally injurious to strength and temper; it often wastes the next day; and, worst of all, it gives a false idea of the country.

Our party is now formed. Messrs Lock, father and son, are attended by Bowers, an able seaman, born in Jamaica and domiciled at Southampton. He is to superintend the sulphur boring; he does the work of half-a-dozen Icelanders, but he has seldom been aboard a nag; and the honest fellow is apt to forget the adage, "astern of a sail and ahead of a horse." Besides Gísli, the skulk, we temporarily engage for nine marks per diem Hr

Hoskulldar Guðmundsson, who is *en route* for his father's house. Hr Gíslason, wishing to attend a fair, accompanies us for the first march. The kind and obliging parson, after feeding us with fish, mutton fresh and dry, sharks' flesh, and seals' haslets—good with vinegar, but even then somewhat too oily—and after insisting upon sundry stirrup-cups of "Iceland wine" (schnapps), determines to start one of the most disorderly of caravans.

We have a total of nineteen ponies all under six years, which would be four-year olds in England, and with the nineteen never a rope. For the most part utterly unbroken, they break away and lose our time; disgusted with their loads, especially with the long boring-rods, they kick and bite, requiring constant reloading. Consequently, Mr Lock misses a carpet-bag, which contains only his money and his papers, and all our baggage suffers more in ten hours than in a year of railways. The commercial complication was enormous; almost each animal had its own hire; one was to be left at this place; two were to be sent on to that: we took the wrong ones with us to Mý-vatn, and consequently we were threatened with a lawsuit. Mr Lock (*père*) has a *largâ manu* manner, but he is strongly imbued with the Anglo-Saxon "idee," to wit,

> "The grand idee that every man jest do what he dam pleases."

He compels the most headstrong to obey him; he remembers the adage, "In Iceland if you want anything, ask for it;" he takes high ground, and he "puts up with no nonsense." The people, gentle and simple, do not openly resent the novelty, but they slang him behind his back, and with a certain dry humour they dub him "Loki,"[1] the bad god of Scandinavian mythology. I can only say that the tone answered well as in Syria or Egypt.

The disorderly party set out about an hour before midnight.

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[1] The name was formerly derived from Loka, to shut, like Wodan from Vaða, even as Juno a Juvando, and Neptunus a nando. The Dictionary suggests that the old form may have been Wloka (Volcanus), the *w* being dropped before the *l* according to the rules of the Scandinavian tongue. It is strange that though Ôðin, Thórr, and Loki were by far the most prominent personages of the heathen faith, the name of the latter is not preserved in the records of any other Teutonic, or rather let us say, Gothic people.

We passed in the dark a mine of magnetic iron disposed, they say, in volcanic rock. This metal cannot be smelted for want of fuel, and its only *raison d'être* in Iceland is to deflect the magnet and to make navigation and the Vatnajökull dangerous. The ugly bridle-path running up the left bank of the Axavatn, and ascending a variety of stony steps, divided by flats of deep moss, with a rare Beitivellir, baiting or pasture ground, and snow-wreaths sounding hollow beneath the tread, showed few features. Before the cold mist set in from the north, we saw at our feet the long Berufjörð, and the spectre of Thrándar Jökull, gleaming white in the pale and glaucous green light of an Arctic midnight; whilst the continuous roar of foss and torrent rang in our ears.

At the foot of the fifth and roughest grade, the Öxarheiði, we halted for a while, where the steep ascent is called, apparently in bitter derision, Vagna-brekka, or waggon-hill. The huge mountain-walls seemed to tower straight above our heads; on the right was the Haurar-Gil (crag-gil), and nearer the Manna-beinafjall, or man-bone hill, where some of Sóti's horsemen were slain. These things the good priest tells us, and then, wringing our hands and bidding us Godspeed, he rides home, bearing with him our best thanks. The very large jar of rum proved too much for one of his friends; after galloping about like one insane, changing his horse every half-hour, and drinking every ten minutes, he lay him down to sleep comfortably upon the soft, cool snow, and lost no time in losing his saddle and saddle-cloth, his bridle and his horse. He will walk into camp at five P.M. next day, sadly crestfallen, if not repentant.

After three hours, during which I felt frozen hands for the first time, we stood on the summit of the Breiðdalsheiði, and looked down upon the long valley to the north. It was a pleasant change after our uncouth way and the *panorama maudit* of the earlier night; but the sunlight, though gleaming pink and gold upon the snow hills to the north, only saddened sleepy eyes. The path leads down the right bank of the Múlaá in the Skriðdalr, a mad stream rolling reckless over slope and drop, green and blue, cold and clear, here deeply encased by huge slices of black trap, there low-banked with long streaks of red-

yellow bog-iron. The left wall was regular with gracious concave lines, ending in the lion-headed Múli, which gives a name to the Múla Sýsla: the right was a succession of buttresses, each owning its own Kvísl, or shallow drain, and the latter were *mauvais pas*, where only the cleverest ponies could spring up and down the rocks without a fall. As we advanced, the valley broadened out into flats of vivid, unwholesome green, bog and swamp spangled with cotton-grass, whose pods much resemble those of the veritable tree-wool, and which should be collected for sheep-fodder. At 9.30 A.M. we forded the stream, and rode up to Thingmúli, much to the edification of the mowers, men in shirt-sleeves and women half-dressed—

> "All hands employed,
> Like labouring bees on a long summer day."

We were not equally edified by their unbusy, dawdling ways: so at the churn the servant girls will work five minutes and rest fifteen.

As I expected, the Thursday was a *dies non*, whose only event was pancake made by the farmer's wife. We inspected the tall Múli, whose bare and ragged head of trap ends the long buttress to the north-north-east: it is bounded east by the Geitdalsá, rising in the Líkárvatn; draining, they say, the Thrándar, and uniting with the Múlaá to form the Grímsá. We botanised at its foot, collecting two equiseta, Elting (spearwort, or *E. arvense*) and Beitill (horse-tail), of which there are many varieties; the Fjóla or violet (*V. montana?*); the Hrossanál, or horse-needle (*Juncus squamosus*); the Blá-ber and Grænyaxlar or young blaeberry (*Vaccinium myrtillus*); the bog-whortle (*V. uliginosum*); the blue-bell (Blá-klukka; *Campanula rotundifolia*, Hjalt.), which grows everywhere, reminding us of Europe; the small, grey birch; the dwarf-willow, all catkins; the Alpine bartsia (Icel. Loka-sjóðsbróðir[1]); the meadow-rue (*Thalictrum Alpense;* Icel. Kross-gras); the fleabane (*Erigeron;* Icel. Smjör-gras) and the ephemeral Veronica. There were also the bright, yellow-green reindeer-moss; the red Alpine catch-fly (*Lychnis Alp.*); the usual "sun's-eye," or butter-

[1] Loka-sjóðr, or Loki's purse, is the cockscomb, or yellow rattle (*Rhinanthus crista galli*).

cup (Sól-ey); the dandelion (Fífill); and the lamb-grass or moss-campion, still in flôwer; the bladder-campion (*Silene inflata*); the pretty, common lyng (heather); the mountain-asphodel (*Tofieldia palustris;* Icel. Sýkis-gras); and, most remarkable of all, the pale-lemon blossoms of the mountain avens already beginning to pall. The Kræki-lyng, the black crowberry (*E. nigrum*), supplied its small, red currants, sweet and mawkish, of which Bishop Pál made sacramental wine; the vine-like Hrútaberja-lyng (*Rubus ling*) trailed on the sward; and the meadow-rose (*Epilobium angustifolium;* Icel. Eyra-rós) reigned queen of Iceland flora. The leafage already showed autumnal tints, yellows and reds taking the place of greens, light and dark; and the air was all alive with grey moths (Fyrireld).

An interesting feature of the Skriðdalr, or slipping dale, is the Skriða range, a name not in the map, but given to the north-eastern buttresses of the broken valley as far as Sandfell. Fronted by dark traps they rise, nude of turf, conspicuous in light-yellow skins of trachyte and Palagonite, based upon a thin and sickly green—we learned to call them the Sulphur Range. As the long streaks and gullies, the broad parting *fiumaras*, and the slides and heaps of footing *débris*, show, the Skriðas are infamous for landslips and snowslips (Snæ-Skriða), the latter overwhelming túns and houses—

> "Multos hausere profundæ
> Vastâ mole nives; cumque ipsis sæpe juvencis
> Naufraga candenti merguntur claustra barathro."

The sole defence against these avalanches (Skriðáfall)[1] is the Skriða-garðr, a dry wall, built very strongly at the sharp angle facing the Skriða and the Snjóflóð, and repaired every year.

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[1] Mr Tuckett, of Alpine fame, shows us anent this word that "strange game (Anglicè, wild-goose) has been started in the dark forest of etymology." Like Avalasse and Avalaison (a *débâcle* of rain or melted snow), the Schnee-schlipfe is certainly derived from the low Latin "advallare," to advance valleywards: others propose "a labendo;" "Lau," the warm spring winds; "avaler" (*e.g.*, avaler son chaperon), the village; "Abländssch," in French "Avéranche," and, lastly, the German Lauwine, "Löwin," because these avalantic descents have the rage and power of a lioness. I may add that in mountainous Europe each valley seems to have its own name, Lavena, Labina, Lavigne, Avelantze, Evalantze, Líantze, etc., etc., etc.: the giant snow-ball is called in and about Italian Recoaro "Valanghi" and "bughi di neve."

In the evening the people began to gather for the fair, and most of them were in that state politely called "excited." One man made himself especially remarkable; with one leg shorter than the other, he was dancing, roaring, snorting fou'; his face was much knocked about; and, with his 'baccy smeared lips, he insisted on succulently kissing every feminine mouth. Mr Lock, sen., had a somewhat narrow escape from a venerable matron whose nostrils showed that she was no better in one matter than our grandmothers: she advanced towards him prognathously, when in the nick of time he turned and fled. He was much shaken, and for some hours looked pale and weak.

The evening might have been in Tuscany; and we drank coffee outside, a practice which excited general reprehension—here you rarely see a bench or seat in the open air. We were lucky in engaging a superior guide, the student Sigurður Gunnarsson, nephew of the archdeacon of Hallormstaðir; his seven years at Reykjavik had given him a tincture of English; he was good-tempered and obliging; in fact, the absolute reverse of Baring-Gould's "Grímr." Hr Gíslason, to the satisfaction of every one, disappeared with his big dog, a cur whose only idea of life was to chivy sheep.[1]

Our day's march was far more interesting than usual: it lay over the long, prismatic tongue of land, a sister formation of the Múli line, separating the Grímsá from its ultimate receptacle, the lake. Amongst the scatter of farms lay Geirólfstaðir, where I slept on return: the house is partly built of greenstone. The mountain path is called, why, I know not, a "Remba," a hard road to travel, from "að rembask," to struggle with, to puff one's self up. The summit of this Hallormstaðarháls was a mere

[1] It is only fair to repeat what the *Standard* (August 29, 1874) says of this worthy: "The man to whom I should strongly advise any English visitors to Iceland to apply for advice and active assistance—a resident in Reykjavik, speaking excellent English, active and energetic, whose name is Gislasson—was, in his early days, a theological student, and previous to his ordination was appointed to the pastorate of Grimsey. He declined to go, and withdrew from the ministry. I do not know whether the Grimsey fishermen lost a good priest or not, but I know that the English gained an excellent counsellor. He is the Grímr of Baring-Gould's well-known book, but if the sketch of him there contained is at all true to the life, he must have wonderfully improved." I have spoken of him as we found him.

divide, not a Heiði with level ground; and from its altitude, about 880 feet, we looked down upon and around a most extensive view. Below us, and stretching to north-north-east, lay the long "broad," known as the Lagarfljót, a milky water evidently from the snow-mountains; and on the nearer shore, protected from the biting blasts, lay the celebrated Skógr, or forest of Hallormstaðir, straggling some twenty miles, and composed of birch-trees,

"If trees they may be called, which trees are none."

Yet from afar they act pretty well as acacias, the point-lace of the forest. To the north-east rise the nubs, heaps, and snows of Höttr, the hats or cowls, and their frost-bound prolongation, the icy range of Borgarfjörð, and, especially, the cones of Dyrfjöll. But every eye turned instinctively southwards when majestic Snæfell, the northernmost outlier of the Vatnajökull, fronted by its two northern outliers, the Hafrsfell and the Laugarfell, shoots up towards the cirri and cumuli of the still air, its glistening glaciers and steely-blue sides making eternal winter in a lovely garb appear.

At Hallormstaðir, our first stage, we failed to find the Prófastr (archdeacon) Sigurður Gunnarsson, who had gone for supplies to Seyðisfjörð. His wife received us kindly with "Yule bread," containing raisins and other delicacies. She must be a model housewife; her six-gabled house was being painted; her kitchen-garden grew unusually fine potatoes; and her poultry-yard was far better stocked than usual. We were hospitably invited to pass the night, and Gísli Skulk looked wistfully at the comforts around him; but we were inexorable and, after a two hours' halt, began operations upon the next stage.

I shall not readily forget that march. The ponies, also, had apparently made up their minds for a half-holiday, and, when refused, they resolved to revenge themselves. Briefly, the loads were everywhere except where they should have been, and the fight at the ford was unusually severe. The bridle-path up the right bank, moreover, was bad, broken with gullies, rugged with rocks, and cullendered with holes; in places we had to avoid headlands of stony teeth by fording the waters; and, as on the skirts of Hermon, the ways were double, high for winter, and

low for summer. Student Sigurður explained Lagarfljót as a corruption of Laugr, a bath; others translate it the "layer" or mixed water, because composed of ice and mud. It is considered unwholesome and undrinkable. The average breadth is one mile and a half, and the people declare that the depth reaches sixty fathoms. It is formed by a glacier stream, the little Jökulsá, flowing through the Fljótsdalr or Norðurdalr, a line which we shall presently follow; and an eastern lake-stream, the Keldá, draining the Syðridalr. The latter rises in the Keldavatn, which the map writes Kelduárvatn, the lake of springs-water; and it is reached in a long day's ride from the Víðivellir, or the Klúka farm, which almost fronts Valthiófstaðir.

I had heard much of the Skógr (Shaw) of the Lagarfljót, as the most beautiful in Iceland: it probably tempted the first settler, Hallormr, to become Hallormr of the Wilderness. In other places, the freezing and thawing of the sap bursts the vessels and kills the plants. Here, however, the Birkis have a backing of heights to concentrate sun-heat, a westerly exposure, and a large sheet of water tempering the cold. The thin birch-scrub grows on all kinds of soil; mostly the trees are mere bushes, but the topmost twigs of the giants of the forest may reach twenty feet, and the timber is heavy enough to make pack-saddles. All are being felled, and none are planted; the weight of the snow is said to destroy the young trees. Nor was the Skóg a vocal growth: I listened long and in vain for the merest chirp.

About an hour before reaching the ferry we had a fair prospect of the Hengifoss, said to be the tallest cataract in Iceland. It is an Icelandic copy of the immortal Cocytus (Mavroneria) in Arcadia, with a fall six times the depth. "Hanging-force" plunges suddenly into a huge caldron, the Hengifossárgil, and is dashed to drops before it reaches the kieve, which is considered to lie 1200 feet below. Its wonders can hardly be appreciated, we were told, without entering the cavity: it faces to the south-east; and, as you ride along the lake, the strata lie exposed to sight, as in a Californian cañon. Amongst them is said to be a small quantity of Surtarbrand.

We had sent on to warn the ferryman, and Charon, Sigfús Stefánsson, of Bessastaðir, with fiery hair, clean-cut red whisker, and huge goggles, was the model of a Scotch pedagogue. Remounting, we galloped *ventre à terre*, the best cure for cold feet, over the turfy flat of the left bank, and found ourselves at Valthiófstaðir, the church and parsonage of Síra Pètur Jónsson. The house was being painted, but we found lodgings in the church: the altar candles were duly lighted, and, after doing what little we could to make ourselves comfortable, we turned in shortly before midnight.

August 3.

At Waltheofstede, whose name is distinctly Saxon, we reduced our stud to the best sixteen head; we bought ropes and horseshoes; we mended the pack-saddles; we paid off the temporary guides; and we engaged the student Stefán Sigfússon, of Bessastaðir, who gave thorough satisfaction when he did not air his ten words of English. Whilst these preparations were being made, I inspected the premises. The farm is of old date, but it is not the Waltheofstede so pleasantly mentioned in the Landnámabók (p. 100): "Tunc servi Erici ruinam villæ Valthiofi de Valthiofstadis intulerunt, Eyolfus autem Saur (Eyólfr Saur) ejus cognatus servos apud Skeidsbrekkas super Vatnshornum occidit, eâ de causâ Eirikus Ejolfum Saurem interfecit, iste quoque Holmgangu Rafnem (Rafn, the duellist) Leifskalis interemit." Thus, in seven half lines, we have a regular monomachist, the destruction of a farm, and the murder of two Franklins, with an indefinite number of thralls. We still find a Thórdísa, in memory of old days, the granddaughter of the parson at Valthiófstaðir.

The church is somewhat larger and better, that is, more tawdry, than usual; and justly vain of it is the district. Outside it is red-striped, with gallery, tower, spire, finial, staff, and weather-cock: the latter bears the cross of Denmark, yet "Odi Danicos, sperno, contemno," is a sentiment frequently expressed in this neighbourhood. Inside it is daubed to mock marble. The bell in the loft bears for date 1744, and the altar-pieces are truly hideous: Sanctus Peterus (*sic*), with key and book, wears his glory on one side of the head, like a cavalry-

man's forage cap. The churchyard epitaphs are funny as usual. Hjörleif Thórðarson (ob. 1786) speaks of his future prospects with a confidence which some might consider premature, if not misplaced:

> "Fluctibus innumeris adversæ sortis in orbe
> Tandem transmissis, jam benè tutus ago;"

and another's long home, a box, has become a classic "urn:"

> "Qui fuit eximium gentis decus undique nostræ
> Gutthormus, jacet hic tenui Hiorlerius urnâ."

More satisfactory was the aspect of the farm, which supports 11 cows and 600 sheep. The labourers' Hey-annir is now begun, and will last for six weeks: they were at work "queerving" the grass, as Shetlanders say, with long thin rakes, so that it may not dry too soon; "mixtæ pueris puellæ," the lasses with turned-up sleeves and the inevitable gloves: at mid-day all seek shelter from the "torrid sun." This essential part of Iceland "agriculture" is well and carefully done; and the number of hands enables the farmer far to surpass anything farther south. The "Taða," or hay from the manured (Tað) infield, opposed to the Út-hey, or produce of the outfield and hills, is close-shaved, and tedded twice, and even thrice, a day: that wanted for immediate use is carried to the house in Kláfrs (creels or crates), articles of universal use, the Leipur of the Færoes, which also carry peat in the Isle of Lewis; and the rest, when thoroughly dry, is stacked and covered with turf. The implements are mere toys, mounted on rods like billiard queues for easy packing and cheap passage. The scythe is a sickle attached to a two-handed stick nine spans long; the blade of three spans, little more than an inch broad, and sharp as a razor, is used here and in the Færoes because the warty ground permits no other. The rakes are of two kinds, with big pegs and with small teeth, both wholly of wood; and in the best farms there are always wheel-barrows and hand-barrows.

The venerable parson, who appeared somewhat "eld-gamall" (*un vieux vieux*), consented to give us an extra guide, a student lad named Thorsteinn, from the north country, whose circumstances

had not allowed him to keep his term at Reykjavik: he was to receive the unconscionable sum of $4 for one day's march. We set out in mid-afternoon, and rode down the Lagarfljót's left bank, in twenty-five minutes, to the ruins of Skriðuklaustr, the last priory founded in Iceland. Two long barrows of earth and stone show the site of the church: they measure 87 feet north to south, and 62 east to west. The fane is surrounded by an *enceinte* of similar humble material: the northern entrance is apparently ancient; that to the west, modern. The habitations of the reverend men were near, but below the little adjoining farm; and there are still fragments of a built causeway running south-west to the cemetery. The latter lay all around the church, and the old custom has been perpetuated: to the south is the grave of Sýslumaður Winne, who died in the early eighteenth century; whilst another heap, which trends east to west, not north to south, is called the "tomb of the bad fellow"—a point of affinity between Icelandic and New Zealand English. Unfortunately, I had no time for skull-digging, and gaining the title of Haugabriótr (cairn-breaker).

We were not asked to dismount, nor did we dismount, at Bessastaðir: the tumulus of the founder, old Bessi (the bear), is a green heap by the river-side. After a general bout of kissing and rekissing, we began the rugged divide separating the Lagarfljót from the Eastern Jökulsá, and at once blundered northwards: when in the worst quagmire the new guides, Stefán and Thorsteinn, a cock-nosed lad of about twenty-two, quietly said, "Há, we should have gone there!" Gradually we rose to 2000-2200 feet, the average altitude of these Heiðis. The foreground was unusually repulsive, and its aspect suggested frost a few inches below. It was a surface of mosses, ever dank and dew-drenched; of iron-stained swamps; of tarns like horse-ponds; of soppy stream beds, with livid-yellow Palagonite encasing the gashes; of brown heath and black peat; of huge heaps instead of the usual warts, as if the farmer had just drawn the manure—in fact, it was a bad specimen of the worst parts of the New Forest centuries ago.

Our eyes, saddened by a path all steps and drops, were suddenly electrified by the first magical view of the Vatnajökull;

it had hitherto been hidden by sundry outliers, especially the Eastern or lesser Eyvindar, a snowless block, or rather double block, curving like a serpent's tail, from left to front, from south to west (275° mag.). For better examination, we dismounted at Vegup—"Collis viæ," said the students.

Behind the Snæfell cone a blue distance of lowland sweeps, like a streak of paint, to the very foot of the "Lake Glacier," whose general aspect is a high dorsum of virgin white, an exaggeration of the Wiltshire downs after a heavy fall of snow. The first thing which strikes me is that the altitude by no means justifies all this eternal frost: we must probably seek a cause in the immense agglomeration of ice behind; in thrust from above, and in the prevalence of southerly, here the frigid, winds. Secondly, the features of the grand *névé* are perfectly separable and distinct, very unlike the dead blank plateau of all the maps. Beginning from the south-west, we notice the domed Kverk (throat) Jökull, fronted by the feature which gives it a name; the huge gloomy mound, fissured to the north, stands boldly out from the pure expanse, and sinks to the level of the deep-blue air. Successively rise the Skálafell (hall-hill), a double cone, connected by a long yoke of miniver, and fronted by a glistening glacier; the three horns of Sval-barð and the ice-mailed points of Snæfellsjökull, not to be confounded with the isolated Snæfell cone:[1] this small Spitzbergen,

> "ribbed and paled in
> With rocks unscalable and roaring waters,"

all bristling with pink and silvery spikes, tapering, tooth ranged near tooth, in formidable array, projects a long slope eastwards. Farther on, the line, *bombé* in the map, bends with a great bay from us. Helped by Olsen and the students, we pick out the various features of the south-eastern corner; the Heinabergs-jökull (hone-hill glacier); the Sauðhamarstindr (sheep-cliff point), a dark mound like a brown cloud; and eastward, again,

[1] This Snæfellsjökull, which we shall see from a far nearer point, is not laid down in the map: it lies due south of Snæfell, the mountain. Thus there are three Snæfells in Eastern and Western Iceland. There are also two Eyvindars, both snowless; one near the road, the other close to the Vatnajökull: we distinguished them as the eastern and the western. Finally, there is an Eastern as well as a Western Skjaldbreið.

the Kollumúli (hind-mull), alternately a black tower and a ridge-end; whilst behind, and upon another plane, flashes a great and glorious snow-peak which, at other angles, assumes the aspect of a bluff or buttress. To the extreme south-east, the blue and snow-streaked horizon, backed by pearly mists, swells into a gigantic bride-cake, the Hofsjökull, bounded west by a pale saddleback, and north of it lies the now familiar dome of the Thrándar ice-mountain. The gold and purple gleams of the westering sun, the opalline play of the projections and prominences which catch the lights, the faint pink-azure of the shades, and the skylarking of the cloud-hosts over the heads of the tallest peaks, set off by the umbreous black foreground, dull and sodden, by the beggarly features of the middle distance, and by the wash of deep damascene blue at the base, fall into glorious picture; and the presence of black spots, like "ermin-ites," in the waste of white suggests the haunts of some Troll-like race—I no longer wondered that there are superstitions about this mysterious realm of eternal snow.

After a sketch, for the purpose of better fixing the picture upon the brain-plate, we jogged on, leaving the snow-streaked Knefill (the pole) to the north; and at eleven P.M. we began the short and rugged descent to the Eastern Jökulsá. The mountain flank was gashed with the hideous chocolate-coloured chasms of the Sharon plain; we had to pull our way-fagged horses down boulder and through bog. As we reached the riverine plain, well sheltered from the wind, the poor beasts recovered courage and carried us gallantly into the new farm, with its three-gabled house, Thorskagerði (codfish garth). Whilst Mr Lock and I put up the tent, "Charlie" bolted into the "eld-house" (kitchen), much to the astonishment of the gudewife, who bolted out in demi-semi-toilette: we supped at the "fashionable" hour of one A.M., and we slept in the broad bright dawn.

August 4.

This was a day of peculiarly hard work; I look back upon it with pleasure, because it introduced me to two new features, the cage and the sand-desert. The forenoon began with the inspection of the Jökulsá, here a frequent name: there are three

which drain the Vatnajökull northwards—the Little Jökulsá, from Snæfellsjökull, forming the headwater of the Fljótsdalr; the Great Easternmost Jökulsá, known to the people as the Vale River (á dalr), or the Bridge Stream (á Brú); and the Great Westernmost Jökulsá, or the Hill River (á fjöllum). Icelanders apply the term Jökulsá Eystri (eastern) and Jökulsá Vestri (western) to the chief headwaters of the Skagafjörð, as those who have read Chapter X. may remember. Our river, an ugly gutter-water, milky, mineral as the drain of a Cornish mining village, and consequently desert of fish, runs in an old valley; and the ledges between the hills and stream are the sites of frequent farms. The deep perpendicular rifts, cut by rain-torrents, are filled with wintry snow; and throughout this part of the country the people use sledges, heavy, tasteless board-boxes on iron runners, wanting all the finish of Russia and North America. The modern bed is mostly a crevasse of grey-blue basalt, black when wetted, built in regular strata, and pitted with drusic pock-holes: the perpendicular walls are split into thick and thin slicings; and slaty *débris* and spoil-banks deform the "broads" where the cliffs sink low into the valley.

The narrowest parts of the bed are naturally chosen for passage; in these gorges there is a great rush from sides to centre, with a furious boiling of the foul stream, tossing up dirty waves, from which there would be scanty hope of escape. On one precipice two ends of Kaðlar (cables), here inch ropes, knotted to one cross-piece, and passed over a second, are made fast under piles of rough stone: on the farther side the cords are roven with a round turn over the cross-piece, and are kept clear of the rock by a wooden bar, battened and rag-garnished, to prevent slipping and chafing. The Kláfur, or cage, is a lidless box, a stool, whose upturned legs are provided with pulleys; it is, in fact, the "cradle" which once crossed the chasm, 65 feet wide, between the Heights and the Holm of Noss in the Shetland Isles. The passenger, sitting or standing, is towed across by one of the two guys, fastened fore and aft. The passage takes about half a minute; you descend the sag with a little run, and are slowly hauled up the other section of the arc. Wire might be an improvement, but it would certainly be rejected as liable to

cut the pulleys. Meanwhile, the guy is always snapping and wanting "splicing;" so, *að fára í Kláfi*, is by no means pleasant to the nervous man, who looks down upon

> "The hell of waters, where they howl and hiss,
> And boil in endless torture."

I need hardly observe that the "cradle" is a form still ruder than the rudest Andine or Himalayan swinging-bridge, which gave a hint—for "travelling teaches"—to the civilised suspension.

We wasted four hours at this river, the chief delay being caused by the horses. The caravan then gathered at Eyríkstaðir, the large farm of Hr Jón Janssen. Whilst the nags were being shod, we drank "blanda," milk mixed with water, the best procurable remedy for thirst. Inquiring about the stage ahead, we were told that it would take four, six, eight, or ten "tíma" (times), not to be confounded with "Klukku-stundir." As the student Thorsteinn had left us, we here engaged for the day's march the owner's brother, Hr Gunnlaugr Janssen, who also gave complete satisfaction.

The afternoon had passed away before we began to clamber up the high eastern bank of the Jökuldalsheiði: presently we came upon a lake country, a scatter of tarns large and small. The map shows half-a-dozen, but not the largest, Ánavatn. Between them lie various hill-ranges, the Western Knefill and Sval-barð (the cool hill-edge), which yesterday appeared to us in epauletted form: to the west lay a Thríhyrningr, with triple peak on a meridian concealing the broad shoulders of Herðubreið. Where hill and water were not, sand, here chocolate-coloured, there bright yellow, gave unusual opportunities for a gallop, especially where the ground was free from dwarf-willow, deep earth-cracks, and streams whose black arenaceous beds bent and swayed under the horses' weight. We were shown our line far ahead, marked by five bits of snow, which, disposed upon a hill-side, passably imitated the human face: it veiled and unveiled itself like a plain coquette.

On such a formation we expected a devious path hard to find; but we were bitterly disappointed by the absence of game, where

heads in thousands have formerly been seen. Here and there lingered a duck or a teal, a snipe or snippet, too wild to approach; the Arctic tern (*Sterna Arctica*, Preyer) was not coy, but a solitary skua (*Lestris Thuliaca?* Pr.), that had gone a-fishing, kept well out of our reach. A sharp canter from No. 2 lake, Gripdeilir,[1] "*Certamen ovium*," according to our literary guides, soon placed us at the lakelet and farmlet of Vetur-hús—winter-house, as opposed to Setr. It is neutral ground between the swamps, which, probably, are under water every spring, and the dry sands of the old sea-shore farther west. The owner, Páll Vigfússon, owns a boat for char-fishing, and a fine flock of goat-like sheep: his kailyard is well manured, to judge from the quantity of soft and brittle puffs (Icel. Gorkúla; *Agaricus fomentarius*), which here take the place of mushrooms.[2] The farm-box was a burrow worthy of St Kilda or Rona in the olden day, entered by a hall like a mine-gallery; the Baðstofa was fouler than the forecastle of a Greek brig; and the three bunks which serve as dinner seats, as well as beds, gave one the shudders. The only caloric was the natural form, which sheep have learned to utilise; and the only chimney was a hole in the kitchen roof. Yet the farm contained provision-room, smithy, workshop, byre, and sheep-house. It was my fate to sleep there on the return march, but I persuaded the good Paudl to put me in a hay-garret. After all, we must remember Sir James Simpson's description of the Barvas district in the Isle of Lewis, where, during the last generation, neither window nor chimney, chair, table, nor metal vessel existed. What a national scandal was this barbarism!

After Vetur-hús we passed sundry farms, and we drank at every place, as if on the banks of the Congo. Men, boys, and maidens came out to be kissed by the two young guides, but we had only once reason to envy their island-privilege. Beyond the Ánavatn lay the Sænaut lakelet, once upon a time haunted by the fabled sea-cow; another pond was passed on the left,

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[1] The Dictionary gives "Grip-deildir," rapine, robbery. Deild (dole, deal) and Deildir (dealings) are common in local names, especially to boundary places which have caused lawsuits, *e.g.*, Deildará (boundary-river), Deildar-hvammr, etc.

[2] Uno Von Troil (p. 108) gives the Icelandic names of four Agarici.

whilst swampy ground extended far to the right. We then ascended a ridge of sand scattered over with basaltic fragments, and saw the Grjótgarðr, or stone-fence. It has a singular appearance, a line of blocks, some of them ten feet square, roughly piled upon one another, and extending half an English mile across the neck of ground. The cubical masses appear like the produce of some quarry. The general look suggests the line of rocks subtending the Grind of the Navir: I can only conjecture that icebergs here meeting and grounding, have deposited their burdens of huge boulder-rocks. The legend is that two Trolls, one a sea-giant and the other a Jökull-giant, agreed to divide their domains; the former started from the north, the latter from the south; they built this wall at the place where they shook hands, and they lived in peace—I was not told whether they married—ever afterwards.

Descending from the Grjótgarðaháls, we halted near the last lake, and collecting a cart-load of willow-roots, which here represent the sage of the Far Western Prairies, we kept out the mist and cold with a roaring fire. The students, too lazy to follow our example, lay upon the ground; yet when riding, these shuddering tenants of the frigid zone muffled their throats in huge comforters, enclosed their hands in worsted gloves, and wore vast waterproofs of oilskin, with other signs of softness. It was the first fire, though not the last, that I saw in Iceland travel.

Resuming our road, we presently began the ascent which had been pointed out to us in the afternoon; crossed a snow-wreath and a snow-patched divide, unusually hard work, and frequently felt the horses sinking fetlock deep in the loose sand. We then descended the misty sides into Heljadalr, and shivered in "Hellsdale." A broad and open way crosses this "Barahút," whose unpleasant title is derived from the tremendous torrents of spring-tide, the deep snows of winter, and the furious dust-storms of the dry season. Leaving the Heljadalsfjall, we entered the cold plain of Geitirssandr; the surface was of water-rolled stones and pebbles, the base of black sand, whilst light-yellow Palagonite appeared in the courses of the dry *fiumaras*. In places there were crater-like heaps of dust from ten to a hundred

feet high, the smaller features perfectly conical, and set off by bars and patches of white sand, lime, potash, and other produce of the sea. Evidently the formation is subaqueous, as well as volcanic,[1] and I subsequently found reason to believe that the ancient sea-beach begins west, and upon the parallel, of the Jökulsá bridge, and runs up to the north-western base of Snæfell, the mountain, not the Jökull. The whole tract reminds one of what is said anent the Barony of Bunen: it has neither wood, water, nor earth sufficient to hang, to drown, or to bury a man.

Walking our fagged horses down the yielding slopes, we presently found the ground improve. A stream flowed to our left; a lakelet lay on the right, and thin grass, well covered with sheep, made the scene an oasis. We again put on steam, and shortly after three A.M. we made the Möðrudalr farm. The church was shut, but the buxom housekeeper took compassion upon our weary plight; basins were brought to relieve eyes red with flinty dust, and skins painful with prickly heat; bowls of hot coffee comforted the inner man, and once more we revelled in the luxury of sheeted beds.

August 5.

The farm of Galiums (etymologically "Madder"), girt by its desert of sand and stone in all directions but the west, where the Western Jökulsá flows at a distance of six indirect miles, is one of the best, if not the best, in Iceland. It is not known in the Landnámabók,[2] which tells us that this quadrant was the last occupied. The white-headed owner, Sigurður Jónsson, has often been offered his own price for it, but to no purpose. He brings out the map and enlightens us upon the features of the wilderness on the other side of the river. He denies the existence of the mountain "Dýngjufjöll hin nyðr Trölladýngjur," immediately south of Bláfjall; and I afterwards found that he was right. Speaking of Baring-Gould's project to attack the Sprengisandur from Möðrudalr, he said that a traveller would be

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[1] The volcanic ashes and lapilli show supra-marine eruptions, but the water-rolled stones tell another tale.

[2] *The* Möðruvellir, the abode of Guðmund the Rich or Powerful, was up the Eyjafjörð, and the map still shows a chapel there.

taking the wrong road; the usual line is from Bárðardalr on the Skjálfjandifljót to the Thjórsá headwaters: moreover, that this Sahara is never passed till early July. He denied that the snows on Bláfjall give any rule for crossing the cap of the Iceland dome, of which one stage is a *jornada* of twenty-four hours, waterless and grainless. He confirmed my idea that the Ódáða Hraun is bounded east as well as west by the sandy region; and he shrugged his shoulders when I consulted him about ascending the local sundial, Herðubreið,[1] distant some sixteen miles. The "Broad-shouldered" stood before us in all his

THE BROAD-SHOULDERED.

majesty, cabochon-shaped, or, as the Syrians say, a "Khatím" (seal-ring), girt by perpendicular walls, and projecting a tall point between the double glacier, here of frosted, there of polished silver, as the surface caught the rays of the noontide sun. It is not my fault if the sketch be very unlike Henderson's "Herdubreid, seen from Mödrudal."

The wife was absent, but the buxom housekeeper let us want for nothing except a sight of the Beauty of Möðrudalr, one of

[1] It is thus written by all travellers: Herði-breiðr, however, from Herðar, would be the adjective "broad-shouldered."

the daughters, who is spoken of by every traveller. The comfortable homestead with three gables showed me amongst other things a map of Palestine; but why did Mr James Nisbet write "Treconitus?" The mill was a turbine, so quaint in construction that the water could not be turned off. *En revanche,* the mutton was admirable: the sheep easily fatten in this dry and delicate air, and like their congeners of Somaliland, they put on flesh with the slenderest rations. Not expecting to see it again, we devoured the fresh meat as if devouring were a duty.

Mr Lock, sen., found the heat oppressive, and we waited till after noon before we set out. A few minutes' riding over grass led into loose, deep sand, evidently a subaqueous formation; and here amongst the hillocks grows the Melr, or wild oat, with pale glaucous and striped leaf, long, tough root, large ear, and grain too small for making bread.[1] We saw none during the night; as on the Sprengisandur, the land was too high to hold water, and the cereal prefers hollows where it can enjoy a modicum of damp. It will extend in scatters and patches as far as Mý-vatn; our horses enjoy it, but the sheep apparently refuse the coarse growth, like the "*pasto fuerte*" of the Argentine Republic. I looked in vain for "birdies" amongst these tufts, probably they find the sands too hot and too cold.

After an hour's slow ride, we turned off the road to the right, where Goðahóll, we were told, shows a temple of Thór. At the southern slope of a hillock known as Selhóll, lay a few loose stones; farther down was the place where the Dóm-hring was held, and northwards a black influent of the Skarðsá formed the Blót-keldar. All was mean and barbarous in the extreme.

We now entered upon what is called the "best road in Iceland." To the left or west lay Sandfell and Geldíngafell; the crests were sharp as rabbits' teeth, and for a similar reason. After about two hours we crossed the Skarðsá, an ugly, dark torrent, the cesspool of the hills, and, following a ledge, we passed through the defile of the same name, Vegaskarð: the formation was of basalt and Palagonite, the pure and the pudding-

[1] According to the "Antiquaires du Nord" (p. 434, vol. 1850-60), "Slesvig" means Vík, or bay, of the Slè or Sli Arundo Arenaria. But is not this word the Icel. Slý, water cotton (*Byssus lanuginosa*), used as tinder?

stone. This *col* debouched upon a Víðidalr, of course nude of withies and willows; the poor and barren slope, cut by black waters, was girt on either side by gloomy hillocks spotted with snow. We halted for a time at the Sel which belongs to Möðrudalr, and the carpenter, a son of the Rev. Pètur Jónsson, kindly offered us a drink.

The "best road" began again, the only defects being rock and deep sand in patches. The ponies, offended by the pace, bit and kicked, shied and bumped their loads. Presently we reached the Biskupsháls, where the saintly men of Skálholt and Hólar once met: two cairns, the Biskupsvarðas, conspicuously placed on a height, divide the Eastern from the Northern Quadrant. During the rough descent, of basalt flaky and red as jasper, leading to the valley, we saw the Jökulsá called á fjöllum, "of the hills," for the all-sufficient reason that it flows in a vale: the map terms this part of the bed í Axarfirði because it disembogues into the Axarfjörð. The milky water flows through a plain of green, thinly veiling the chocolate-coloured face of earth. Beyond it, half hid by gloomy mist, lay the Desert of Mý-vatn, and, farther still, rose the slaty-blue cones and ridges with which we were presently to become familiar.

Shortly before ten P.M. we rode up to the Grímstaðir establishment belonging to the farmer and ferryman, Guðmund Árnason: he was absent at the time, so his surly wife was duly kissed on the mouth by the temporary guide, a peasant from Möðrudalr. This place trades, especially in wool and mutton, with Vopnafjörð, distant a hard day's ride; and by this line travellers from the eastern ports usually make the Mý-vatn. The sheep, mud marked on the rump, are good, and give rich milk, but both articles are inferior to those of the "model farm" which we last sighted. Grímr, the old Norwegian founder, chose a capital site; a grassy slope gently rising from the right bank of a stream, and protected by a ground-wave in front from the draughts and moving sands of the river-side. It is marked by the Hálskerling, *alias* the Grímstaða Kerling, a natural pyramid, conspicuous to those coming from the west: farther off rises the Haugr cone, snowy always. To the north of the establishment is the workshop; and here I saw for the first time horns of the reindeer,

which had been shot about Herðubreið: they are common in the neighbouring establishments. The guest-room, entered by a small porch, had a wainscot painted to resemble maple; a gold beading and mahogany furniture; but it boasted neither stove nor fireplace, and, as usual, a whisper rang through the house. Then came the family parlour, with eight windows, each single-paned, facing south: the rest of the building consisted of outliers, byres, the sheep-house, known by the normal central trough, and the usual artless windmill.

August 6.

This morning the owner, a rough, hard-faced and obliging man, in appearance much like our typical "Lowlander," lectured me in the geography of the Útgarð, or outer regions; and an hour before noon we cantered over the three or four miles to the river. This Jökulsá is about 200 yards across, with a sand-bank hard by the left shore. The sides are of crumbling basaltic sand, red and yellow Palagonite, and water-rolled stones; on the right lay a little strip of equisetum, and opposite it were clumps of wild oats, which promised well for a ride to the south. The turbid, slaty-white stream flows at the rate of at least three knots an hour: there is a tradition of its being swum by a horse-stealer, but the cold would deter most men unless riding for dear life. Now low in the bed, it must rise at least five feet, as appears from the driftwood, ground to little bits, which forms the high-water mark. The rule of Andine travellers is to cross such rivers about dawn, when the nightly frost has bound the snows which feed them. The map places its chief sources in the northern border of the Vatnajökull, but the details cannot be relied upon. The length must be at least 120 miles; and as the fall from Grímstaðír to the sea is about 1200 feet, there can be no navigation except in the several reaches, and we can hardly be surprised that it forms the Dettifoss, the small Niagara of little Iceland. The ferry was shaped like a spoon amputated at the handle; it was always half full; and four trips were made necessary by the extent of our belongings. We sat amongst the Eyrarós, the islet roses, representing the oleanders of Syria, and watched the nags swimming across, with their heads as usual

well up-stream—apparently the custom of towing them from the boat is obsolete in Iceland, at least I never saw it.

Shortly after noon we attacked the Mý-vatn Öræfi, the wilderness of Mý-vatn, which is very perfunctorily laid down in the map. It is not wholly barren. The surface is composed of ropy and cavernous lava, with bursten bubbles and extinguished fumaroles, growing thin grass, the usual flowers, dwarf birch, ground-juniper, and two species of willows, the grey always in the neighbourhood of forage; these stripes overlie and alternate with barren volcanic sand and stones, bad retainers of water. The larger arteries of fire-stone, as usual in Iceland, are called Hraun-fljót (run-floods), and the smaller veins Hraun-arða. The sheep of Reykjahlíð and other farms are driven to the green parts during the fine season; it is a *pays brûlé*, but we shall presently see something far worse. Here, again, game was almost wholly wanting. Plovers sat upon the stone-heaps, and the stringy curlew (Spói), which our ancestors loved to "unioynt" (carve), cried over our heads; possibly they knew that their insipidity and toughness would save them from any but steel-tipped teeth. A few ptarmigan ran almost from under our horses' hoofs, ejaculating Reu! reu! reu! They are excellent eating, but it is a shame for any but starving men to shoot them at this season, when the grey-brown poults, little balls of fluff, are still unable to fly. The bird may be stupid, but it is an excellent mother, praise which can by no means be accorded to all clever animals; it appears wholly to forget self when aiding in the escape of its progeny. At this season ptarmigan come down from the barren uplands to seek flowers and berries in more genial climes; yet a few days and they will retire with the young family to safer homes.

The remarkable mound on our left, a refuge to "lifters" in olden times, is known as Hrossaborg, the Horse-fort. From afar it appears a mere shell of stratified mud; a nearer approach shows a worn and degraded Herðubreið, with regular couches of Palagonite clay falling steep on all sides but one. The huge semicircus opens to the east, where its drainage sheds to the Hrossaborglindá, the stream of the Horse-fort spring, flowing from the south, and much affected by sheep.

I found no sign of lava, but an abundance of sand around it; if it ever erupted, the discharge must have been like that of Hverfjall, which we shall presently visit. Beyond it the sand is lively as that of Sind: on my return I saw a dozen columns careering at the same time over the plain although rain had fallen during three days. Our caravan was struck by one of these "Hvirfilsbíld-ör" (whirlwind bolts), which arose close by; unlike the Shaytan of the Arabian wild, which is adjured with "Iron, O Devil!" it did not even remove our hats. The pillars, which spread out at the top like a stone-pine in Italy, may have been 200 feet high: some travellers, imitating the licence of Abyssinian Bruce, swell the altitude to 2000 yards.

As the gear wore out, so the loads fell with unpleasant persistency, making us plod slowly over good riding ground. In front rose a semicircular ridge, extending from north, *viâ* east, to south of the lake, and thickly studded with hills and cones. The map calls it Mý-vatns Sveit, the Mý-vatn district; our student corrupted it to "Sveinn" (puer), opposed to Stúlka, a lass. The latter reminded us of the Joe Miller attributed to the British sailor who understood why women were called "Snorers" (Señoras) in Spain, but could not explain their being "Stokers" in Iceland. This mild joke had power to comfort us whilst all manner of topographical details concerning Jörundr, Hlíðarfell, Búrfell, Hvannfell, Sighvatr, and Bláfjall, were poured into our dull and dusty ears. We halted for a few minutes at the little farm Eystrasel, and then pushed forward to the solfatara. After threading the Námaskarð, where the air was not balsam, we sighted the lake, one of the ugliest features of its pretty kind; and at 8.30 P.M., preceding my companions, I rode in to our destination, Reykjahlíð. The features here only named will be described at full length in the following chapter.

ITINERARY FROM BERUFJÖRÐ TO MÝ-VATN.

BERUFJÖRÐ TO THINGMÚLI.

Wednesday, July 31, 1872.

Left Berufjörð at 10.45 P.M. Line north-west up left bank of Axarvatn stream, draining to Berufjörð; turf, sand, stones, washed from gullies. Five distinct steps, separated by undulating ground; path rough; cold mist; mountain streams to cross.

1.15 A.M. (2 hours 30 min.).—Halted at foot of fifth step, Hænu-brekka (hen-ledge), the worst.

Walked up Hænu-brekka; snow-slope, path along *névé;* bending to north, rough Öxarheiði, broken plain, tiers of trap, about 700 feet above sea-level. Crossed sundry wreaths and beds of snow.

2.45 A.M.—Summit of Breiðdalsheiði; path marked by three Varðas. Changed nags, 3.45 A.M.

Down valley of Múlaá, in the great Skriðdalr; watershed changes from south to north.

6.30 A.M.—Passed first farm, Stefánstaðir; little Bær on left bank of stream, and west of Skriðavatn; little lake, or rather "broad" of river. On right, falls in the eastern path over the Berufjarðarskarð. Farms every half-hour.

7.45 A.M.—Arnaholtstaðir farm; to-morrow will have cattle fair; some sixty head for sale.

8.10 A.M.—Hallbjarnarstaðir, backed by its hill; general trend, south-east to north-west.

Several farms together. At 9.30 A.M., forded Múlaá, girth-deep; rode up to *Thingmúli* (⊙ I.) chapel and farm, under priest of Hallormstaðir. Good property; seventy sheep, and eight cows.

Night's work, 10 hours 45 min., halts included. Average march, 3 to 3½ miles an hour. On map, direct geographical miles, 17. Direction, north-west, bending to north.

Morning fine and sunny. Mist at 8 to 9 A.M.; heavy at 3

P.M. Night cold, raw, and foggy; about midnight, mist from north.

Paid farmer, Davíð Sigurðarson, $5; his wife wanted $3 more. Little trodden paths more expensive. People have no standard of value.

THINGMÚLI TO VALTHIÓFSTAÐIR.

Friday, August 2.

Set out, 12.30 P.M. Forded river, rode down Grímsá valley; often crossed stream; best road near the bank. After 45 minutes, left Grímsá, and struck the Melar or barrens at foot of divide. To left Geirólfstaðir, small farm of civil people, where I slept August 19. Up the long green slope of Hallormstaðarháls; less abrupt than western slope. Reached summit 3 P.M. (aneroid, 29·32), and began rough and abrupt descent. At 3.15 crossed Hafursá (buck-goat river), a dwarf ravine. Trap in steps, and red-ochre fields to left. Lagarfljót Lake below; both banks easy slopes; green ledges and swamps, crossed by causeways. Bridle-path well kept, because it is road to Eskifjörð, the port. Farms everywhere; see seven on western side. Passed through the "Skóg," forest of Hallormstaðir. General direction, north-west; direct distance, 4 geographical miles.

4.10 P.M.—(After 3 hours 40 min. slow = 2 fast) Reached Hallormstaðir. Left it at 6 P.M. Up right bank of Lagarfljót; succession of torrents, gullies, and bad stony places, which can be rounded. Rode under the Rana-Skóg (wood of the hog-shaped hill). Big sand-bar of Gilsa forms a tongue of boulders and bad torrent if the ford is not hit. Path double, summer along lake and in water; winter, higher up. Deep holes between basaltic blocks; horse sinks breast-high.

8.30 P.M.—At Hrafnkelstaðir (proper name of man), opposite Hengifoss cataract, on other side of lake.

9 P.M.—Opposite fine farm, Bessastaðir.

9.30 P.M.—Ferry below junction of two forks of Lagarfljót; swift, cold stream; breadth, 200 yards; current, 3 knots; horses swam in 2 min. 30 sec. On return, forded it higher up, when

split into three large and three small streams. Another ford, wither-deep, farther down. Paid ferry, $2.

⊙ II. 10.45 P.M.—After 20 minutes' gallop over green plain, reached Valthiófstaðir church and parsonage. Second march (general direction, south-south-west), 3 hours 30 min. = 10 indirect geographical miles. Total day's work, 7 hours 10 min. = 14 miles.

Aneroid, 29·94; thermometer, 76° (second observation, 29·96; thermometer, 83° in sun).

Morning gloriously clear. At 10 A.M., cloudy and sunny. 2 P.M., sun hot, and people complained. Cirri and cumuli over the Vatnajökull. Evening clear and cool.

Valthiófstaðir to Thorskagerði.

Saturday, August 3.

Started 2.45 P.M.—Took upper road to avoid túns; lower better.

3.10 P.M.—Ruined monastery, Skriðuklaustr. Delayed 15 minutes.

Crossed ugly boulder-torrent, which wetted the beds. Reached Bessastaðir farm, 3.50 P.M.

At 4.30 P.M., true start over the Fljótsdalsheiði. Map shows nearly straight line from east to west. Not travelled over now. We struck north-west-west; stiff rise for 45 minutes. Rotten ground, and cold air.

Reached first step at 5.10 P.M. Aneroid, 28·73; thermometer, 76°, on summit.

First view of Vatnajökull from Vegup (Vègúp? or Vegupp?), 6.20 P.M.

Aneroid, 27·92.

On the southern road (Aðalbólsvegr) the highest point of the divide was shown by aneroid 27·80.

7.30 P.M.—Reached midway height, water stagnates; presently the versant changed, and the Miðvegr (half-way) torrent flowed west to the great Jökulsá. Despite Varðas, lost way half-a-dozen times. Ground more and more rotten.

10.30 P.M.—Crossed boulder river, Eyvindará, and turned from north-west to south-west. Began descent.

11 P.M.—The western is the shortest, the Eastern Jökulsá being some 900 feet above the Lagarfljót. Crossed many streams divided by ridges.

N.B.—The Holkná (water of the rough stony field) is misplaced in the map. It is south of Eyríkstaðir, on opposite bank. Rode along river banks; air much warmer.

⊙ III. 12.40 P.M.—Reached Thorskagerði. Ferryman's house newly built.

Total on road, 9 hours 55 min.; very slow work; about 7 to 8 hours' real work. Distance measured by map, 22 to 23 geographical miles. General direction, north-west and west-south-west.

In morning, sun and strong north wind. Then clouds from south. At 5 P.M. saw a shower in the Lagarfljót. 7 P.M., drops of rain.

THORSKAGERÐI TO MÖÐRUDALR.

Sunday, August 4.

Early in the forenoon, crossed the (E.) Jökulsá in the cage. The horses were driven to the ford, 200 yards below. Only four of sixteen swam over at first trial, in 1 hour 30 min. The rest were driven farther down, and seven passed over in 1 hour 30 min. to 2 hours 30 min. The last five were towed over with a rope. Occupied 4 hours. Ended at 12.45.

Loaded at Eyríkstaðir; left bank of, and 100 feet above, stream. Aneroid at 2 P.M., 28·98; thermometer (in shade), 60°.

Set out at 5 P.M. Up the high left bank of stream, and at once lost the road. Line not traced in map; it lies between the Möðrudalsvegr, north, and the Jökuldalsheiði to the south. Began to cross the great divide, a tableland, not a prism, between the two Jökulsás.

At 6 P.M., aneroid, 27·90; thermometer, 74°.

Passed north and along foot of Eyríks mountain. Entered a region of lakes or tarns; whole surface has been under water, and probably is so still in spring. Buðará reservoir and stream to right. Divided by dust plains, chocolate and bright-yellow; good galloping-ground.

On right, second lake, Gripdeildr, at foot of Sval-barð Hill.

8.15 P.M.—Vetur-hús farm and lakelet; 3½ Danish (14 geographical) miles from Möðrudalr. On return, rode in 4 hours 45 min.

End of first stage, which occupied 3 hours 15 min. = 4 geographical miles.

Resumed road, 8.30 P.M. On left big lake, Ánavatn (Áni proper name), not in map.

9.20 P.M.—Sænautasel (shieling of the sea-cow), a little bye, belonging to the large Rangalon (Ranga, proper name, and -lón, sea-loch, inlet, still-water) farm to north. There is also a Sænautavatn and a Sænautafjall to west. Another lakelet to left. Up rise, a regular divide; swampy region to right. Examined the "Halse of the stone wall" (Grjótgarðaháls). Lakes and swamps again; peats cut here.

10.45 P.M.—Halted near edge of last swamp or lake. This second stage occupied 2 hours 15 min. = 4 geographical miles.

Set out, 11.15 P.M. Bad descent to Rangaá (river), headwater of Hofsá, going to Vopnafjörð. Map does not prolong it so far south. Exchanged swamp for sand and snow-fonds.

Into Heljardalsfjall. Broad smooth plain of Geitirssandr.

Aneroid, 28·08.

Along hill-side to first steep descent; pyramid hill to left. Second deep descent, the Skarð leading to plain of Möðrudalr.

☉ IV. Arrived at Möðrudalr, 3.10 A.M. Third stage, 4 hours = 12 miles. Total of day, 9 hours 30 min.; the distance, according to the people, being 25 English miles. We made it 20 geographical miles.

Aneroid, 28·50; thermometer, 70° (in room).

Grey morning; sunny noon; high north wind; then heavy clouds; but no rain till after we were lodged.

Möðrudalr to Grímstaðir.

August 5.

General direction, almost due north.

In morning took sights.

Herðubreið, 263° 30′ to 266° mag. (local variation – 40°), or 223° 30′ to 226° true.

Kverkfjöll, 248° 30′ mag.

Fagradalsfjall, 244° to 246° mag.

$6 to owner, and $2 to student guide.

Set out, 2.45 P.M. Made for Geldíngafell (11° mag.), in line of tall cliffs. Sandfell, rounded cone, on left. To right (eastward) was Vegahnúkr, 45° mag., and the rocks and tumuli of Nýpi, or Núpur, 64° mag. Not in map. Soon off grass into deep sand.

At 3.45 turned back, and lost twenty minutes visiting Goðahóll.

4.45 P.M.—Crossed Skarðsá, ugly black torrent, influent of Western Jökulsá. Along a *corniche*, the Vegaskarð, a pass through the hills. Dun-coloured Palagonite clay upon the stones; large blocks of conglomerate and yellow basaltic rock below.

5.15 P.M.—The Miðvegr (mid-way).

Sharp riding to Víðidalr; ugly barren slope, black waters, foul stream feeding Jökulsá. Red hill on left.

6.20 P.M.—Halted at farm; two white gables; many byres. Halted.

First stage, slow work, 3 hours = 10 geographical miles.

Set out again, 7.15 P.M. On right, Grímstaða Kerling, natural pyramid of rock, used by trigonometrical survey.

8.45 P.M.—Biskupsháls.

Skirted Ytri Núpur, northern hill, bounded south-west by Grímstaða Núpur.

9.15 P.M.—Good gallop over grass; rolling ground up and down.

⊙ V. Crossed rivulet south of farm, and reached Grímstaðir farm, 9.45 P.M.

Second stage, fast; 2 hours 30 min. = 12 miles. Total, 5 hours 30 min., half-slow, half-fast = 22 direct geographical miles.

Paid guide, $1; he wanted $2. Will gallop back in two hours.

Morning hot and dry; sun oppressive; in afternoon, cool and cloudy air. About 8 P.M., cold east wind; hands numbed.

In evening, dense cloud, like ice-fog, rose from the horizon and covered the sun.

Aneroid, 28·88; thermometer, 52°. Next morning, aneroid, 28·72; thermometer, 59°.

Grímstaðir to Mý-vatn.

August 6.

General direction, nearly due west. Took sights, and farmer gave names:

1. Jörundr, bare cone of Palagonite, which we shall leave to right, or north, 334° mag.
2. Búrfell, tall blue hill, south of our road, 300° mag.
3. Hvannfell, at north end of Bláfell, 293° mag.
4. Fremrinámar, at south-east end of Bláfell (from afar very like Krísuvík), 276° 30′ mag.
5. Herðubreiðarfell (not to be confounded with true Herðubreið), called by people, Dýngjufjöll; long line of low heaps and craters, partly concealing snows of Herðubreið.

Paid $4 for pasture, $2 for ferry (Henderson paid $3), and $2 for this day's guide, who has two horses, and returns in the evening.

11 A.M.—Left farm; pricked over plain, sand-outs, and thin scrub.

12.15 P.M.—Jökulsá River; 3 miles. Aneroid, 28·90; thermometer, 63°.

Ferry made four trips. Horses swam to island in 1 min. 15 sec.; spent two hours at river.

Remounted, 2.15 P.M. Passed Hrossaborg block, and began the Mý-vatn Öræfi (Desert of Mý-vatn).

Rode slowly; loads falling. Line, lava runs (five large) and sand; many little craters studding the plain. In front, detached hills and cones, arc of circle with hollow towards lake. The Mý-vatns Sveit (district).

6.30 P.M.—Little farm, Eystrasel (in map, Mý-vatnssel), 1 hour 30 min. from Reykjahlíð; swamp to east, and stream to west. Line marked by tall Varðas, alternate layers of turf and sticks.

Up and down the Námaskarð (*col* of the wells), dividing Dalfjall, the northern, from Námafjall, the southern range. Pass through the heart of the solfatara.

At west end of pass sighted the Mý-vatn.

⊙ VI. 8.30 P.M.—Arrived at Reykjahlíð, our destination.

Second stage from river, 6 hours 15 min. = 17 to 18 direct geographical miles, riding fast and slow. Total of day's work, 7 hours 30 min. = 20 miles.

Dull, grey morning; threatens glare and warmth. Wind from north-west; showers on hills. Dust clouds on plain, showing excess of electricity; signs of heat, not of rain. Sunny afternoon; gloomy evening.

Nº 1.

THE REYKJAHLIÐ AND NÁMARFJALL SPRINGS.

Nº 2.

PLAN OF FREMRI-NÁMAR.

Nº 3.

PLAN OF LEIRHNÚKR & KRAFLA (SPRINGS.)

M.ª Farlane & Erskine Lith.rs Edin.r

CHAPTER XIV.

THREE DAYS AT THE SOLFATARA OF MÝ-VATN.

I CANNOT accuse myself of failing to do traveller's duty at Mý-vatn: although the weather became raw and rainy, not an hour was wasted. The first step was to climb the nearest height and form a general notion of Midge-water, which must not be derived *à micturitione Diaboli.* It is said to be forty miles in circumference—you might as well measure round a spider—and the "gorgeous green isles" look like lumps of mud in a horsepond; their only use is to grow angelica; but we saw them under a dull grey sky, like an inverted pewter-pot. The mean of many observations gave for the aneroid 29·12, and the thermometer 54°: if this be correct, Midge Lake must be nearer 900 than 1500 feet above sea-level. Travellers tell you that the fair dimensions were curtailed by the great eruption of Leirhnúkr and Krafla (1724-30); that the lava is not yet thoroughly cooled; and that consequently the surface is never wholly frozen. But the Krafla, as we shall see, can never have flowed here, and there are old craters and hornitos, volcanoes in miniature, all about the edge: the whole becomes a solid sheet of ice, except where sulphur and other minerals send forth springs more or less tepid; moreover we found a depth of only 27 feet. The bottom is black and muddy; the water along shore is shallow and weedy, sedgy and spumy, whitening the coast and the island edges; it is glorious breeding-ground for the blood-drawing "chief inhabitants of the district." Gnat terrors are emphatically noticed, and one traveller assures us that the people wear a visored cassinet of black cloth to guard head and neck. They are compared with those *feræ naturæ*, the midges of Maine; "No-see-ums," the "Indians" call them. We brought

veils, and hardly saw a "Mý"—but then, the cold weather was against the "bodies of Behemoths and the stings of dragons." Nor did we find Mý-vatn "a place where birds and fishes abound, and where many of the wonders of Iceland are concentrated." Every student of the avi-fauna who has sighted the pool, from the days of Proctor and Krüper to those of Shepherd[1] and Baring-Gould, makes it a very happy hunting-ground: all give lists which bring water to the sportsman's mouth. Ten short years, however, have made the latest obsolete. We did not meet with a single Iceland falcon, once so common; the birds, with the exception of gulls, a host of sandpipers, and plucky little terns, whose sharp beaks threatened our heads and eyes, were rare in the extreme; and we found defunct chicks at every few hundred yards. Although we boated and shot over the ugly puddle, our only bag consisted of a mallard, a widgeon, a few grebes and pipers, and the Sefönd or horned grebe (*Podiceps cornutus* or *auritus?*), tufted on both sides of the head. The waters supplied trout and char; there is no salmon, as the fish cannot leap the falls twenty-five miles from the lake. Dead shells lay everywhere upon the spumy margin, and the corpse of a duck was found studded with mollusks. The soil, disintegrated volcanic rock, is of the richest; some thirty farms and farmlets are scattered about the Hlíðar or ledges between the several lava-gushes; and the pastures support some 3000 sheep.

The Mý-vatn is somewhat in the delta shape, with the apex fronting west (◁), and with the base extending seven to eight miles: its drain, the Laxá frá Mý-vatn, escaping about the point and feeding the Skálfandi Fjörð, must be a mere torrent. North of it is the lumpy, uninteresting mound, Vindbeljarfjall, "wind-bellows hill;" the bag to the south, and the nozzle to the north-east; an African pair of bellows, *i.e.*, one "bellow," if such word there be. It is a trigonometrical station like the Hlíðarfjall, a bare cone north-east of Reykjahlíð. The points and promontories are most remarkable to the south, but these and other features will be better observed on the road to the Fremrinámar.

[1] This traveller mentions eider-ducks at Mý-vatn. We saw none, and the farmers declare that the birds do not leave the sea-shore.

My general survey ending about noon, I set out for Leirhnúkr and Krafla under the guidance of Hr Pètur Jónsson, the farmer of Reykjahlíð. The tall, burly old man, made taller by contrast with his little Jack nag, had fenced himself against the grey mist and skurrying sea-wind by the usual huge comforter meeting the billy-cock hat behind; by "conservators" of green glass, and by a mighty paletot of the thickest Wadmal. We followed yesterday's road, and now I carefully observed the lay of the land. Beyond the green and grassy point, Höfði (the headland), we came upon sundry veins of lava about a century and a half old, and much like slag: where Palagonite-conglomerate forms the surface, begin the Sandfell and the Hlíðarnámar (Lithe-wells), the latter wrongly confounded in the map with the Námar to the east of the Námafjall range. A couple of boards some six inches long were the only signs of work. The dirty-yellow mountain, striped from top to toe, as if washed by rain, with primrose, brick-red, dark blue, pea-green, light blue, and chalky-white, now stood smoking before us; and beginning the ascent, we passed the two boulders of pure sulphur, from which every traveller has carried off a bittock. Threading the Náma-skarð by a decent path, we wound first to south and then to north, till we sighted the mud caldrons on the eastern slope. In Henderson's day they numbered twelve; in 1872 apparently they were on their "last legs:" two lay to the north, four to the south; they were shaped like Sitz baths, and they ejected, with a mild puff which could not be called a roar, spirts of repulsive slime, blue-black, like mud stained by sulphate of iron. These "Makkalubers" contrasted strongly with the patches of lively citron and sprightly pink all about the slopes. One traveller finds it a "most appalling scene"—he must be easily "appalled."

Debouching upon the eastern plain, we rode along the foot of the Dalfjall (dale-hill), which continues the Sulphur Range to the north, hugging the sides to avoid the Steiná, another bed of newish lava, an impossible mass of cinder, brown, black, and red, on our right. The path was well grown, but the "lady of the woods" (birch) is a dwarf in these parts, and looked tame beside the patches of Dryas. We flushed sundry ptarmigan,

which were certainly not "absurdly tame." After an hour and a half of "Trossacks," which on return was covered in forty-five minutes, we halted at Skarðsel, a little Setr or summer shieling, a mere "but and ben" without tún, a heap of peat and stones grubbed out into rooms. The primitive churn found in every dairy shows that the ewes' cream is here made into cheese, whilst the skim-milk forms the national Skýr. Of course the animals are poor and thin all the year round—the effect of continued "drain upon the constitution."

Beyond the Skarðsel, we began to ascend and round sundry diseased and mangy hills, walking up the higher pitches, and riding over peat mounds, based upon oldish lava. After a total of two hours, we dismounted at the foot of Leirhnúkr (mud-knoll), where the horses' hoofs flung up mere sulphur, and where warm, damp air escaped from every hole. The view from the summit convinced me that the emplacement has been poorly described by travellers. It is the northern head of a thin spine, a sharp prism about a mile broad, lying almost upon a meridian (215° mag.), and continuing the heights of Thríhyrningr, Dalfjall, and Námafjall. At some distance to the north-west rises the snowy buttress, Gæsadalsfjöll (geese-dale hills), almost concealing the Kinnarfjall (cheek or jaw mountain). Nearer lies a chain of cones and craters, with sundry outliers; they seem to have discharged a torrent nine miles long by three of maximum breadth, which inundated the north-eastern corner of the Mý-vatn with veins and arteries of fire; and the scatter of hornitos and fumaroles to the north has also aided in the work of destruction, or rather reconstruction. The map shows only a patch of lava reaching from Leirhnúkr to the Hlíðarfjall cone south-west.

The Leirhnúkr proper is composed of two hillocks trending north and south; the southern is larger than the northern, and the whole, a long oval extending some 2000 paces, is one vast outcrop. The lowland to the east is far broader than the western, a mere slip; here frequent splotches of sulphur and anaphysemata, or gas vents, lead to the Krafla springs. The aneroid showed the summit of the Mud-Knoll to be about 2000 feet above sea-level. Henderson (i., p. 167) calls it a volcano, and connects it with his

other volcano, Krafla, by a non-existing ridge; but with him, *omne ignotum*, etc.—Hrossaborg and even Herðubreið are volcanoes. When he compares the scenery with that of the Dead Sea, one of the fairest of salt-water lakes, we must remember that his idea of "Asphaltites" was borrowed from that lively modern writer, Strabo.

We then remounted and rode over the dwarf Phlegræan fields to the Námar of Krafla,[1] the *immense soufrière* of M. Robert. The lowland is here studded with many inverted cones of cold, blue water; the principal feature being Helvíti Stærra (Greater Hell). It is an irregular circle, with little projections at the longest diameter, north-west to south-east, a large, tawny funnel of burnt clay and bolus, the degradation of trachyte and Palagonite, about 800 yards across. This is the famous "mud-caldron of Krabla," a "natural phenomenon hardly inferior to the Geyser;" but Henderson's Hell of 1815 was greatly changed in 1872; and we shall see far larger features at the Hverfjall and the Námarkoll. Instead of that "terrific scene," the "jetting pool" of wild illustrations, a lakelet smiling in the bright sun, which burst the clouds about two P.M., a placid expanse of green-blue water, cold, and said to be deep, occupied the bottom of the hole, and the only movement was a shudder as the wind passed over it. I could not help thinking of "La belle vision d'Élie, ou un Dieu passe sous la figure d'un vent léger." Despite the "abrupt and precipitous descent, 200 feet deep," there is no difficulty in descending the sides of "Olla Vulcani," now the mere dregs of a volcano.

After inspecting this poor, "abolished Hell," we rode round it northwards, crossing sundry snow-wreaths, which on the Libanus would be called Talláját, and left our cards upon "Little Hell." The latter is composed of two smaller lakes on a higher plane, one bearing east-south-east and the other south-east. Between the pair lie some half-dozen slimy-bordered "leir-hverar,"[2] mud-boilers of

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[1] Pronounce but do not indite "Krabla"—there is no such written word as Krabla. The Dictionary gives "að krafla," to paw or "scrabble;" it also means to scratch, and perhaps the obtuse agricultural mind has connected this pastime with the evil for which sulphur is a panacea.

[2] Some travellers call them Makkaluber, and Icelanders write "Makalupe," a

fetid smell: the ejections bubbled and spluttered, falling into their own basins, and the fumes did not prevent the growth of Fífa and bright lichens.

After seeing what you may see in almost any solfatara, we rode to the north-east, and in twenty minutes we ascended the turfy and muddy northern cone of Krafla mountain; a mass of Palagonite, pierced, to judge from the surface scatters, with white trachyte. An isolated cone appears in the map; I found that the northerly part sweeps round to the north-north-east, connecting with the Hágaung (high-goer), a long, meridional buttress of similar formation; whilst the south-eastern prolongation anastomoses with the black mass called the Hraftinnuhryggr or "Obsidian mountain." I utterly failed to discover any sign of crater: we are told that Krafla was torn in half during the last century, and Henderson apparently makes Great Helvíti the remains of the bowl. From the apex, where the aneroid showed 27·30, we could trace the course of the Laxá; and a gleam in the north was pronounced by the farmer to be the Axarfjörð, a corner of the house where dwells *Le Père Arctique.* Upon the black summit, where we

"Toil and sweat, and yet be freezing cold,"

Dryas was still in bloom, and violets and buttercups were scattered over the lower slopes. I looked in vain for specimens of the plumbago or black lead, reported to be found on Krafla. There is no objection to its presence in this katakekaumene; "graphitical carbon" was found by M. Alibert in the volcanic formations of Siberian Meninski, so it is not confined, as at Borrowdale, to the "primitives."

As we were descending the hill, my guide inspected a flock of his own sheep, and I vainly attempted to lay in a store of fresh mutton. These people would probably sell, if they could get $8 to $9 per head, some 2000 of their 3000 animals, and greed of gain would leave them almost destitute. Yet here, as at other farms, it is impossible, even with a week's work and offering treble price, to buy a single head; excuses are never wanting,

corruption of Macaluba, famed for air volcanoes, near Girgenti, itself a corruption of the Arabic "Maklúb."

"There is no one to send! All the ewes have lambs! The lambs are not fit for food!" The latter probably means that the lamb will in time become a sheep; the wild negro of the African interior, equally logical, expects a chicken to bring the price of a hen. In Tenerife I should have shot a wether, and have left the price upon its skin.

A shallow valley led to the Hraftinnuhryggr, where previous accounts would induce you to expect a "mountain of broken wine-bottles," all "shining with their jetty colouring." The thin strew upon the streamlet sides and about the feet was of small fragments, which became larger as I ascended. Mostly it was black and regular, that is, not banded, and the outer coating was a reddish paste: in places it forms a conglomerate with sandstone, and on the eastern summit, where trachyte also crops out, it seems to be *in situ*. M. Cordier (p. 278) translates the word "*pierre de Corbeau*," thus robbing the raven: he proposes "*gallinace*" (*i.e.*, turkey-buzzard), for the glassy material of pyroxenic base, reserving "obsidian" for the felspathic. From this place, I believe, came the specimens lately studied by Dr Kennott of Zurich: one of them exhibited under the microscope, "numerous small, brown, hollow bodies, of globular and cylindrical shape, regularly arranged in definite series." Obsidian has been found north-east of Hekla, passing into pumice, and old Icelandic travellers seem to confound it with pitchstone, asphalte, or bitumen of Judea, a vegetable produce. Many of the obsidians are remarkably acid. "Iceland agate" (why?) must be handled with care, as Metcalfe found to the cost of his bridle-hand. Iceland ignores the pure "stone age" of Tenerife and Easter Island; and though strangers pick up specimens, the "volcanic glass" here has never been worked, as by the natives of the Lipari group. I observed that Ravenflint ridge, which prolongs the Krafla, is itself prolonged by the Sandabotnafjöll, and by the Jörundr, which the map makes an isolated cone. The classical name of the latter suggests memories of the old anchorite of Garðar.

The day ended pleasantly. After finding what there was and what there was not to be seen, I galloped back in a fine sun and warm evening, and after seven hours thirty minutes of total

work, found my companions busy in pitching the tent, despite the cold threats of night. They complained of the stranger's room, although it rejoiced in such luxuries as two windows, a bed and curtains, looking-glass, commode, map, thermometer, and a photograph of Jón Sigurðsson. The house, with five gables, fronts west-south-west to "Wind-bellows hill;" here the south wind is fair and warm, the norther brings rain, the easter is wet, and the wester dry and tepid. As in England, the south-

REYKJAHLID CHURCH—(miraculously preserved).

wester is the most prevalent, and flowers thrive best where best sheltered from it. The house has the usual appurtenances, workshop and carpenter's bench; smithy and furnace; byre and sheep-fold. The shabby little windmill, with three ragged sails, goes of itself, like Miss K.'s leg; there is an adjacent Laug, of course never used, and the nearness of the lake renders a Lavapés (rivulet) unnecessary. Plough, harrows, watering-pot, and hay-cart are also evidences of civilisation, but the kail-yard is nude

of potatoes — probably they require too much hard labour. Shabbier than the windmill, the church, bearing date 1825, lacks cross, and wants tarring; it has no windows to speak of, and the turf walls are built after an ancient fashion, now rare, the herring-bone of Roman brickwork. The cemetery around it is indecently neglected, and bones, which should be buried, strew the ground. Baring-Gould (1863) gives an account of its chasubles and other ecclesiastical frippery, which may still be there, unless sold to some traveller. It is a lineal descendant of that "church which in an almost miraculous manner escaped the general conflagration" of 1724-30. Henderson adds the question, "Who knows but the effectual fervent prayer of some pious individual, or some designs of mercy, may have been the cause fixed in the eternal purpose of Jehovah for the preservation of this edifice?" I may simply remark that lava does not flow up hill; the stream split into two at the base of the mound, without "being inspired with reverence for the consecrated ground," and united in the hollow farther down. Yet travellers of that age derided the Neapolitan who placed his Madonna in front of the flowing lava; and when she taught him the lesson of Knútr (Canute) the Dane,[1] tossed her into the fire with a *'naccia l'anima tua*, etc., etc., etc. Superstition differs not in kind, but only in degree.

The reason for the tent-pitching soon appeared. The burly farmer has a lot of lubberly sons, and two surly daughters; "Cross-patch" and "Crumpled-horn" being attended by half-a-dozen suitors and women friends, *bouches inutiles* all. If we look into the kitchen, these Lucretias make a general bolt. There is extra difficulty in getting hot-water, although Nature, as "Reykjahlíð" shows, has laid it on hard by; and even the cold element is brought to us in tumblers. The coffee is copiously flooded; this is feminine economy, which looks forward to the same pay for the bad as for the good; and cups, which suggest "take a 'poon, pig," poorly supply the place of the pot. One of the sons speaks a little English: we tried him upon the lake, and

[1] The docks of Southampton, built where he sat, have somewhat stultified the simple wisdom of the old man.

after two hours' rowing he was utterly exhausted. Besides, there are lots of loafers, jolter-headed, crop-eared youngsters,

> "With no baird to the face
> Nor a snap to the eyes,"

who are mighty at doing nothing: they peep into, and attempt to enter, the tent; when driven off they lounge away to the smithy, or to the carpenter's bench, and satisfied with this amount of exercise, they lounge back into the house, where we hear them chattering and wrangling, cursing and swearing, like a nest of young parrots. They remind me of the Maori proverb, "Your people are such lazy rogues, that if every dirt-heap were a lizard, no one would take the trouble to touch its tail and make it run away." They cannot even serve themselves: the harder work is done by a pauper couple, a blind man and his wife, who sleep in the hay-loft. The only sign of activity is shown by the carpenter, Arngrímr, a surly fellow, wearing a fur cap, like a man from the Principalities, and with mustachioes meeting his whiskers, like those of the Spanish Torero. "He is Nature's artist," says the student, meaning that he has taught himself to paint, and *hélas!* to play flute and fiddle. So the evening ends with ditties, dolefully sung, and the Icelandic national hymn, the latter suggesting Rule (or rather be Ruled) Britannia. We are curious to know how all these sturdy idlers live. They fish; they eat rye-bread and Skýr; they rob the nests, and at times they kill a few birds: the best thing that could happen to them would be shipment to Milwaukee, where they would learn industry under a Yankee taskmaster. I have drawn this unpleasant interior with Dutch minuteness: it is the worst known to me in Iceland.

The old farmer, Pètur Jónsson, lost no time in deserving the character which he has gained from a generation of travellers; his excuse is that he must plunder the passing stranger in order to fill the enormous gapes which characterise his happy home. Yet he makes money as a blacksmith; he owns a hundred sheep, and he is proprietor of a good farm. In his old billycock, his frock-coat and short waistcoat, he looks from head to foot the lower order of Jew; we almost expect to hear "ole clo'" start

spontaneously from his mouth. He began by asking $3, to be paid down, for the Krafla trip, and $4, the hire of four labouring men, for trinkgeld to the Fremrinámar; and the manner was more offensive than the matter of the demand. His parting bill was a fine specimen of its kind. It is only fair to state that he bears a very bad name throughout the island.

Next day the north wind still blew; the heavy downpour at five A.M. became a drizzle two hours later; and at ten A.M. there was a blending of sunshine and mistcloud, which showed that we had nought to fear save a shower or two of rain and sleet. Mr Lock (*fils*) and I determined upon a ride to the Fremrinámar; "a field of sulphur and boiling mud," says Baring-Gould, "not visited by travellers, as it is difficult of access, and inferior in interest to the Námar-fjall springs." After breakfast, we set out, each provided with two nags, which we drove over the lava-field to the Vogar farm, about half-an-hour distant on the other side of the grassy point, Höfði. This "oasis in the lava"—a description which applies to all the farms of Eastern Mý-vatn—was the parsonage in Ólafsson's day (1772); we expected to find the Jón Jónsson mentioned by Shepherd, who had learned English in Scotland—he had, however, joined *il numero dei più*. As sometimes happens to the over-clever, we notably "did" ourselves; the owner, Hjálmar Helgason, a very civil man over a tass of brandy, was, we afterwards found out, a son-in-law of old Pètur; he also, doubtless informed of the *rixe*, demanded $4, which we had to pay; he kept us waiting a whole hour whilst the horses were being driven in, and he sent with us a raw laddie, whose only anxiety was to finish the job.

Shortly after noon we rode forward, crossing the unimportant Gjá, which the map stretches in a zigzag south of Reykjahlíð; we passed the "horrid lava-track" of Ólafsson, a mild mixture of clinker and sand, and in twenty minutes we reached Hverfjall, lying to the south-east. From afar the huge black decapitated cone, symmetrically shaped and quaquaversally streaked, has a sinister and menacing look. It is not mentioned by Henderson, whose account of the Mý-vatn is very perfunctory. According to Baring-Gould, it is "built up of shale and dust, and has never erupted lava:" as the name shows, it contained a Hver, or mud-

spring. We mounted it in ten minutes, and found the big bowl to consist of volcanic cinder and ashes based upon Palagonite and mud: the shape was somewhat like that of the Hauranic "Gharáreh" which supplied the lava of the Lejá. The aneroid (28·70; thermometer, 83°) showed some 800 feet above Reykjahlíð; and the vantage-ground gave an excellent view of the lake, with its low black holms and long green islets, of which the longest and the greenest is Miklaey (mickle isle). This *Monte nuovo* was erupted in 1748-52; and a plaited black mound in the easily-reached centre shows where the mud was formerly ejected. Almost due south of it lies a precisely similar feature, the Villíngafjall. These formations are technically called Sandgýgr, "sand craters," opposed to Eld-gýgr, the "fire abyss;" and their outbreaks form the "sand summers" and the "sand winters" of arenaceous Iceland and its neighbourhood. I look upon the Hverfjall as the typical pseudo-volcanic formation of the island.

The real start was at one P.M., when, having rounded the western wall of the Hverfjall, we passed east of a broken line of craters based upon thin-growing grass. The whole can be galloped over, but 'ware holes! Nor did I find the skirt of a lava-flood always an "unsurmountable barrier to Iceland ponies," although in new places it may be. On the east was Búrfell ("byre" hill), the name is frequently given to steep, circular, and flat-topped mounds; south-west of it lay the Hvannfell, long and box-shaped. Farther to the south-west, and nearly due south of the lake, rose Sellandarfjall, apparently based on flat and sandy ground; patches of snow streaked the hogsback, which distinguished itself from the horizontal lines of its neighbours. Far ahead towered the steely heights of Bláfjall, which from the east had appeared successively a cone and a bluff: it still showed the snows which, according to travellers, denote that the Sprengisandur is impassable; the last night had added to them, but the lower coating soon melted in the fiery sun-bursts. The line of path was fresh lava overlying Palagonite; and in the hollows dwarf pillars of black clay were drawn up fróm the snow by solar heat: their regular and polygonal forms again suggested doubts about the igneous origin of basalt, which may simply

result from shrinking and pressure. This columnar disposal of dried clay, and even of starch desiccated in cup or basin, was noticed by Uno Von Troil as far back as 1770.

After an hour's sharp ride, during which my little mare often rested on her nose, we struck a cindery divide, a scene of desolation with sandy nullahs, great gashes, down whose sharp slopes we were accompanied bodily by a fair proportion of the side: of course the ascents were made on foot. The material is all volcanic and Palagonitic; here trap and trachyte *in situ* apparently do not exist: as we made for a *Brèche de Roland*, east of Bláfjall, we passed a sloping wall of white clay; and at half-past three we halted and changed nags at the Afréttr (*compascuum*), to which the neighbouring farmers drive their sheep in July and August. The lad called it the Laufflesjar, leafy green spots in the barren waste. We saw little of the willow which he had led us to expect; but the dark sand abounded in flowers and gramens; the former represented by the white bloom of the milfoil (*Achillea millefolium*), which the people term Vallhumall,[1] or "Welsh," that is, "foreign," hop; and the latter by the Korn-Súra (*Polygonum viviparum*), viviparous Alpine buckwheat. A snow-patch at the western end of the plainlet gave us drink; and thus water, forage, and fuel were all to be found within a few hundred yards. The guide said it was half-way, whereas it is nearly two-thirds, and we rode back to it from Bláfjall, which bears 100° (mag.), in an hour.

Resuming our road we rounded the sides of the hillocks, and presently we attacked a Hraun unmarked by Varðas. Discharged by a multitude of little vents, the upper and the lower portions are the most degraded; the middle flood looks quite new, and ropy like twisted straw. We now sighted and smelt the smoke pouring from the yellow lip, which looks as if the sun were ever shining upon its golden surface, and which stands out conspicuous from the slaggy, cindery, and stony hills. At five P.M., after a ride of four hours and a half, we reached the northern or smaller vent, an oval opening to the north-north-west, and we placed our nags under shelter from the wind. The hair was

[1] Thus in the Dictionary. Baring-Gould (p. 429), or possibly his printer, calls it Vell-humall, which would be "gold hop."

frozen on their backs into "*lamellæ niveæ et glaciales spiculæ;*" they had no forage beyond a bite at the Afréttr, and we were on a high, bleak level, the aneroid showing 27·10, and the thermometer 40°.

When the sun had doffed his turban of clouds, we sat upon the edge of the Little "Ketill" and studied the site of the Fremrinámar, the "further springs," because supposed to be most distant from the lake. From the Öræfi the pools seem to cluster about the yellow crater; now we see that they occupy all the eastern slope of the raised ground, the section of the Mý-vatns Sveit extending from Búrfell to Bláfjall. The northern vent is merely one of the dependencies of Hvannfell; the southern or Great Crater belongs to the "Blue Mountain." We presently turned southwards and ascended the Great Kettle, which Paijkull declares to be "probably the largest in Iceland." This Námakoll, "head" or "crown of the springs," is an oval, with the longer diameter disposed north-east to south-west (true), and measuring nearly double the shorter axis (600 : 350 yards).[1] The outer wall, raised 150 to 200 feet, is one mass of soft sulphur covered by black sand; every footstep gives vent to a curl of smoke, and we do not attempt to count the hissing fumaroles, which are of every size from the thickness of a knitting-needle upwards. With the least pressure a walking-stick sinks two feet. We pick up fragments of gypsum; alum, fibrous and efflorescent; and crystals of lime, white and red, all the produce of the Palagonite, which still forms the inner crust; and we read that sal ammoniac and rock-salt have also been found. The rim is unbroken, for no discharge of lava has taken place; the interior walls are brick-red and saffron-yellow, and where snow does not veil the sole, lies a solid black pudding, the memorial cairn of the defunct Hver or Makkaluber. From the west end no sulphur fumes arise; south-eastward the ruddy *suffioni* extend to a considerable distance.

The Appendix will describe the old working of these diggings, which did not pay, although the hundredweight cost only ten shil-

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[1] In 1776 Professor Henchel found it "about 200 paces in diameter." (See Appendix, "Sulphur in Iceland," Section I.)

lings. At the southern end a staff planted in the ground amongst the hissing hot coppers still shows the labourers' refuge, a shed built with dry lava blocks. If Professor Henchel characterised them correctly as "bad, because all the sulphur was taken away last year" (1775), they have wonderfully recovered in the course of a century: evidently "all the sulphur" means only the pure yellow flowers lying on the surface. The mass of mineral is now enormous. The road to the lake is a regular and easy slope, and working upon a large scale would give different results from those obtained by filling and selling basketfuls.

From the summit of the Námakoll we had an extensive view of the unknown region to the south. Upon the near ridge stood the Sighvatr rock, the landmark of the Öræfi, from which it appears a regular pyramid: here it assumes the shape of a *Beco de papagaio*. I now ascertained that there are no northern Dýngjufjöll, or rather that they are wrongly disposed upon the map. I wonder also how that queer elongated horse-shoe farther south, the "Askja" or "Dýngjufjöll hin Syðri," came to be laid out; but my knowledge of the ground does not enable me to correct the shape. North of Herðubreið lay the Herðubreiðarfell, all blue and snow-white. To the south-west stretched far beyond the visible horizon the Ódáða Hraun, which most travellers translate the "Horrible Lava," and some "Malefactors' Desert" or "Lava of Evil Deed." The area is usually estimated at 1160 square miles, more than one-third the extent of the Vatnajökull, which it prolongs to the north-west. Viewed from the Námakoll it by no means appears a "fearful tract, with mountains standing up almost like islands above a wild, black sea." I imagine that most of the *contes bleues* about this great and terrible wilderness take their rise in the legendary fancies of the people touching the Útilegumenn, or outlaws who are supposed to haunt it. I observed that Hr Gíslason prepared a pair of revolvers in case we met them upon the Öxi; and I found to my cost that even educated men believe in them. Previous travellers may be consulted about the Happy Valleys in the stone-desert, the men dressed in red Wadmal, the beautiful women, and the horn-shod horses. I can only observe that such a society has now no *raison d'être;* it might have had reasons to fly its kind, but a

few sheep lost during the year are not sufficient proofs of such an anomaly still existing.

All I saw of the Ódáða Hraun was a common lava-field, probably based upon Palagonite. It seemed of old date, judging from the long dust-lines and the stripes tonguing out into ashes and cindery sand. The surface was uneven, but not mountainous; long dorsa striped the ejected matter, and the latter abounded in hollows and ravines, caverns and boilers. Many parts retained the snow even at a low level, and thus water cannot be wholly wanting even in the driest season. Here and there were tracts of greenish tint, probably grass and willows, lichens and mosses; possibly of the lava with bottle-like glaze over which I afterwards rode. The prospect to the south-south-west ended with a blue and white buttress, an outlier of the Vatnajökull, which might be the (Eastern) Skjaldbreið.

We proposed to return by the eastern road *viâ* the Búrfell, but our guide declared that the lava was almost impassable, and that the hardest work would not take us to Reykjahlíð before the morning. Having neither food, tobacco, nor liquor, and being half frozen by the cold, we returned *viâ* the Afréttr; we passed to the east of Hverfjall, not gaining by the change of path; and after a ride of eight hours and a half we found ourselves "at home" shortly before eleven P.M. My feet did not recover warmth till three A.M.

August 9th was an idle day for the horses, which required rest before a long march to the wilderness; the weather also was rainy, and more threatening than ever. I proceeded to examine the Hlíðarnámar, or Ledge-springs, and to see what boring work had been done by my companions.[1] The "smell of rotten eggs," the effects of "suffocating fumes" upon "respiratory organs," which by the by can only benefit from them, and the chance of being "snatched from a yawning abyss by the stalwart arms of the guide"—we were our own guides—had now scanty terrors for our daring souls. They have been weighty considerations with some travellers; their attitude reminds me of two Alpine climbers who, instead of crossing it, sat down and debated whether, as

[1] The lay and the succession of the strata so much resembled those quoted in Mr Vincent's paper that they need not be repeated here.

fathers of families, they would be justified in attempting that snow-bridge. Perhaps the conviction that the "abyss" here rarely exceeds in depth three feet, where it meets with the ground-rock, Palagonite, may account for our exceptional calmness. The reader will note that I speak only of the Hlíðarnámar: in 1874 they tell me a traveller was severely scalded at some hot spring.

The Hlíðarnámar west of the Námafjall, which Henderson calls the "Sulphur Mountain," are on a lower plane than the Námar proper, east of the divide. They are bounded on the north by the double lava-stream which, during the last century, issued from the north-east, near the base of the Hlíðarfjall: to the south stretch independent "stone-floods," studded with a multitude of hornitos, little vents, and foci. The area of our fragment of the great solfatara extending from the mountain, where it is richest, to the lava which has burnt it out, may be one square mile. It is not pretty scenery save to the capitalist's eye, this speckled slope of yellow splotches, set in dark red and chocolate-coloured bolus, here and there covered with brown gravel, all fuming and puffing, and making the delicate and tender-hued Icelandic flora look dingy as a S'a Leone mulatto.

We began with the lowlands, where the spade, deftly plied by the handy Bowers, threw up in many places flowers of sulphur, and almost pure mineral. Below the gold-tinted surface we generally found a white layer, soft, acid, and mixed with alum; under this again occurred the bright red, the chocolate, and other intermediate colours, produced either by molecular change, the result of high temperature; or by oxygen, which the steam and sulphur have no longer power to modify. Here the material was heavy and viscid, clogging the spade. Between the yellow outcrops stretched gravelly tracts, which proved to be as rich as those of more specious appearance. Many of the issues were alive, and the dead vents were easily resuscitated by shallow boring; in places a puff and fizz immediately followed the removal of the altered lava blocks which cumbered the surface. In places we crushed through the upper crust, and thus "falling in" merely means dirtying the boots. Mr Augustus Völlker, I am told, has determined the bright yellow matter to be almost

pure (95·68 : 100). The supply, which has now been idle for thirty years, grows without artificial aid, but the vast quantities which now waste their sourness on the desert air, and which deposit only a thin superficial layer, might be collected by roofing the vents with pans, as in Mexico, or by building plank sheds upon the lava blocks, which appear already cut for masonry. According to the old traveller, Ólafsson, the supply is readily renewed; and Dr Mouat ("The Andaman Islanders") covers all the waste in two or three years.

Leaving our nags in a patch of wild oats, which, they say, the Devil planted to delude man, we walked up the Námafjall, whose white, pink, and yellow stripes proved to be sulphur-stones and sand washed down by the rain so as to colour the red oxidised clay. Here we picked up crystals of alum and lime, and fragments of selenite and gypsum converted by heat into a stone-like substance. The several crests, looking like ruined towers from below, proved to be box-shaped masses of Palagonite and altered lava; the summits, not very trustworthy to the tread, gave comprehensive prospects of the lowlands and the lake. Upon the chine we also found mud-springs, blubbering, gurgling, spluttering, plop-plopping, and mud-flinging, as though they had been bits of the Inferno: the feature is therefore not confined, as some writers assert, to the hill-feet facing the Öræfi. The richest diggings begin east of the crest, and here the vapour escapes with a treble of fizz and a bass of sumph, which the vivid fancy of the Icelandic traveller has converted into a "roar." My companions were much excited by the spectacle of the great *soufrière*, and by the thought of so much wealth lying dormant in these days of "labour activised by capital," when sulphur, "the mainstay," says Mr Crookes, "of our present industrial chemistry," has risen from £4, 10s. to £7 a ton, when 15 to 20 per cent. is a paying yield in the Sicilian mines, and when the expensive old system of working the ore has been rendered simple and economical as charcoal-burning. And we should have looked rather surprised if informed that all these mines were shortly to be extinguished by a scientific member of the Society of Arts.

In the evening, which unexpectedly proved the last when we

three met in Iceland, the conversation naturally fell upon sulphur and sulphur-digging. The opinion expressed by Professor Jönstrüp, who in 1871 had used the six-inch boards, was also duly discussed. He was undoubtedly right in believing that for exploitation foreigners can do more than natives, and that money spent by the Danish Government would only weight the Icelander's pocket. But he gave a flourishing account to Mr Alfred G. Lock, who, after wooing the coy party since 1866, has obtained a concession for fifty years; the only limiting condition being that he is not to wash in running waters, an absurdity demanded by local prejudices. For many years the Iceland diggings were a "bone of contention" between England and France. In 1845, M. Robert, the same who quietly proposed robbing the Iceland spar, wrote, "Aussi doît-il bien se garder de jamais accorder aux Anglais qui l'ont sollicitée, la faculté d'exploiter ces soufrières; comme on l'a fait en Laponie a l'égard des mines de cuivre." Let us hope that under the enlightened rule of philanthropic Liberal Governments, nations have improved in 1874. But as the Iceland fisheries prove, the French rulers have ably and substantially supported their fellow-subjects, whereas ours find it easier and more dignified to do nothing, and to "let all slide." Nothing proves England to be a great nation more conclusively than what she does despite the incubus from above. Nothing is more surprising than to see the man whom you have known for years to be well born, well bred, and well worthy of respect, suddenly, under the influence of office or of public life, degenerating into the timid Conservative, or the rampant, turbulent Radical. But the do-nothing policy of late years must give way the moment pressure is put upon it, and popular opinion requires only more light for seeing the way to a complete change.

I did not visit the House-wich of old Garðar Svafarson nor the road by which the Mý-vatn sulphur has been shipped in small quantities to Copenhagen, but Mr Charles Lock kindly sent me a sober and sensible description, which is given in his own words.

"The Húsavík line is very good, being for the most part over gently undulating downs, with basalt a few feet below the surface; crossing no streams of importance, and having a fall of

1500 feet in a distance of 45 miles.[1] It is wrongly shown in Gunnlaugsson's map, for instead of being on the eastern side of Lángavatn it skirts the western shore of that lake, and it likewise passes on the western side of Uxahver.

"Húsavík harbour is a very good one, judging from the description given us by Captain Thrupp, R.N., of H.M.S. 'Valorous,' who spent some time there this summer. An old Danish skipper said it was perfectly safe when proper moorings were laid down, no vessel having been lost in it during the last thirty years. He has been trading between Copenhagen, Hull, and Húsavík for twenty-five years past, reaching the latter port each year about the end of February, and making his last voyage home in October. Between October and February there is generally a quantity of ice floating off the coast, which hinders vessels entering the harbour."[2]

I also asked my young *compagnon de voyage* to collect for me, upon the spot, certain details of the earthquake which occurred in the north-eastern part of the island, and which, as was noticed in the Introduction, did some damage at Húsavík. On the afternoon of April 16, three shocks were felt; two others followed during the afternoon of April 17; the second was remarkably violent, and throughout the night the ground continued, with short intervals of repose, to show lively agitation, which on the 18th reached its culmination. All the wooden huts were thrown down, and the stone houses were more or less shaken, the factory alone remaining in any measure habitable. Some cattle were killed; there was no loss of human life, but from twenty to thirty families were compelled to seek shelter in the outskirts. Nobody remained in the dilapidated little market-town except the Sýslumaðr, whose family left for Copenhagen in the steamer "Harriet," bringing the news to Europe—I met them on their return to Reykjavik, and they confessed having been terribly startled and shaken. During the three days after the 18th, the vibrations continued with diminished violence; they were unimportant in the immediate neighbourhood of Húsavík; they were

[1] As has been seen, I would considerably reduce these figures.

[2] This "banquise," as the French call it, is said to form a compact belt extended thirty miles from shore in the Skjálfandifjörð.

insignificant about Krafla, and when the vessel sailed they had wholly ceased. There was also a report that the crater in the icy depths of the Vatnajökull had begun to "vomit fire."

This much the *Norddeutsche Allgemeine Zeitung* had informed me: Mr Charles Lock added the following details: "During the eight days of earthquake the thermometer (R.), during the night, fell as low as −8°. The direction of the shocks was from east to west, and some of them were very severe. The inhabitants were so much frightened that they crowded on board a vessel which chanced to be in port. I was not told that the effects were at all felt in the harbour. The Sýslumaðr slept in one of the streets for several nights. Many small cracks were left in the ground when the shocks had subsided; but these have since been filled up: some naturally, others by the peasants."

Let us now "hark back" to Mý-vatn.

As a wandering son of Israel once said to me, in my green and salad days, "Gold may be bought too dear." The question is not whether sulphur exists in Iceland; it is simply "Can we import sulphur from Iceland cheaper than from elsewhere?" Calculations as to profit will evidently hinge upon the cost of melting the ore at the pit's mouth, and of conveying it to a port of shipment: however cheap and abundant it may be in the interior, if fuel be scarce and roads and carriage wanting, it cannot be expected to pay. My opinion is that we can, if science and capital be applied to the mines. The digging season would be the hot season; and the quantity is so great that many a summer will come and go before the thousands of tons which compose every separate patch can be exhausted. But this part of the work need not be confined to the fine weather: it is evident, even if experience of the past did not teach us, that little snow can rest upon the hot and steaming soil. As one place fails, or rather rests to recover vigour, the road can be pushed forward to another—I am persuaded that the whole range, wherever Palagonite is found, will yield more or less of the mineral.

The first produce could be sent down in winter to Húsavík by the Sleði (sledge). When income justifies the outlay, a tramroad on the Haddan system would cheapen transit. The ships which

export the sulphur can import coal to supply heat where the boiling springs do not suffice, together with pressed hay and oats for the horses and cattle used in the works. As appears in the Appendix, turf and peat have been burned, and the quantity of this fuel is literally inexhaustible. It will be advisable to buy sundry of the farms, and those about Mý-vatn range in value between £300 and a maximum of £800. The waste lands to the east will carry sheep sufficient for any number of workmen. The hands might be Icelanders, trained to regular work, and superintended by English overseers, or, if judged advisable, all might be British miners. Good stone houses and stoves will enable the foreigner to weather a winter which the native, in his wretched shanty of peat and boards, regards with apprehension. Of the general salubrity of the climate I have no doubt.

The sulphur trade will prove the most legitimate that the island can afford. Exploitation of these deposits, which become more valuable every year, promises a source of wealth to a poor and struggling country; free from the inconveniences of the pony traffic, and from the danger of exporting the sheep and cattle required for home supply. And the foreigner may expect to enrich, not only the native, but himself, as long at least as he works honestly and economically, and he avoids the errors which, in the Brazil and elsewhere, have too often justified the old Spanish proverb, "A silver mine brings wretchedness; a gold mine, ruin."

These statements, printed in the *Standard* (November 1, 1872), have lately been criticised by a certain "Brimstone" (*Mining Journal*, August 29, and September 19, 1874). He is kind enough to say, "I have the greatest respect for Captain Burton as a traveller, but none whatever as an inspector of mining properties"—where, however, a little candour and common sense go a long way. And he is honest enough to own, despite all interests in pyrites or Sicilian mines, that the "working of the sulphur deposits in question may possibly, with great care and economy, give moderate returns on capital." His letters have been satisfactorily answered by Dr C. Carter Blake and Mr Jón A. Hjaltalín. It only remains for me to remark that nothing is easier than to draw depreciatory conclusions from one's own

peculiar premises. "Brimstone," for instance, reduces the working days to 150, when the road would be open all the year round to carts and sledges; he considers the use of sledges upon snow a "fantastic idea," and he condemns the horses to "eat, month after month, the oats of idleness," whereas they can be profitably employed throughout the twelve months either at the diggings or in transporting the ore. The statistics of Iceland emigration prove that even during the fine season a sufficiency of hands might, if well and regularly paid, be "withdrawn into the desert from fishing and agricultural operations," which, after all, are confined to the Heyannir, or hay-making season, and which take up but a small fraction of the year, between the middle of July to the half of September. Moreover, there is little, if any, fishing on the coasts near the northern mines. The report of the Althing shows that ten, and sometimes twenty, labourers worked at the Krísuvík diggings, where fishing is busiest, during almost the whole winter of 1868-69, and the silica mining of Reykjanes was not interrupted during December and January 1872-73. The spell is from five to six hours during the darkest months, the shortest day in Iceland being five hours. About mid-March the island night is not longer than in England, and from early May there is continual daylight till August, when the nights begin to "close in." The hands in the southern mines were paid from $3\frac{1}{2}$d. to 6d. per hour. Professor Paijkull made the northern sulphur cost 3 marks per cwt., and the horses carried 3 to $3\frac{1}{2}$ cwts. in two days to the trading station: Metcalfe also declares that 200 cwts. per annum were melted at Húsavík, and that the price was half that of Sicilian. "Brimstone" complains that the distance from the coast is variously laid down at 25 (direct geographical), $28\frac{4}{5}$, 40, and 45 (statute) miles, when the map and the itineraries of many travellers are ready to set him right. He need hardly own that he has no personal knowledge of Húsavík, Krísuvík, or any part of Iceland, when he sets down "such necessary little items as loading, lighterage, harbour-dues, improving Husavik, brokerage, et cætera," confounding the ideas of Snowland and England. After a startled glance at the cost of British labour, "and, worse still, of idleness during the greater part of the year"—a phantom of his own raising—he asks, "What about the demoralisation

consequent on the latter, and on the inevitable use and abuse of the spirits of the country, in order to while away the time?" The Brazil is surely as thirsty a land as Iceland, yet my host, Mr Gordon, of the gold mines in Minas Geraes, would be somewhat surprised, and perhaps not a little scandalised, to hear that his white, brown, and black hands cannot be kept from drink. Briefly the objector's cavils may be answered in the "untranslatable poetry" of the American backwoodsman, "T'aint no squar' game; he's jest put up the keerds on that chap (Sicily) from the start." I have no idea who Mr "Brimstone" is, but I must say that he deserves a touch of his own mineral, hot withal, for so notably despising the Englishman's especial virtue—Fair Play.

On the other hand, my notes on the Mý-vatn mines drew from a Brazilian acquaintance, Mr Arthur Rowbottom, the following note, containing an inquiry which unfortunately I could not answer:

"I read your account of the sulphur mines of Myvatn with great interest and pleasure; and from your report I should feel disposed to believe that boracic acid exists in the same district. You will, no doubt, remember the conversation we had on board the 'Douro,' returning from Brazil, about the very large fortune made by Count Larderel out of the boracic acid produced in the Tuscan lagoons situated near Castelnuovo. Wherever native alum and brimstone are found, there are always traces of borate of soda in one form or another. Boracic acid exists at the Torre del Greco, and in Volcano of the Lipari Islands.[1] The locality where the 'Tincal' is found in Thibet is reported to be plutonic; in fact, nearly all the countries from whence the borate of soda is drawn are somewhat similar to the sulphur districts of Iceland; and I should feel greatly obliged if you could inform me if boracic acid or borate of lime exists in the island."

[1] It was there found by the late Sir Henry Holland; Dolomieu had some specimens, but he did not know whence they came.

CHAPTER XV.

RETURN TO DJÚPIVOGR AND END OF JOURNEY.

SECTION I.—RIDE TO HERÐUBREIÐ.

August 10.

WE were humanly threatened with rain on the fourth day, but my aneroid gave me better news. The principal difficulty was to find a guide for the southern Öræfi. Hr Pètur's sons shrugged their shoulders and pleaded illness—"*pituitam habent*" explains the student—they swore that the farm horses were not strong enough to traverse the grassless waste. After a three days' search, I managed to secure a *dummer junger*, named Kristián Bjarnason of Eilífr, who had once almost reached the base of Herðubreið; and old Shylock lent him, for a consideration, two lean nags, with orders to go so far and no farther. My own stud consisted of eight, and only one of these carried the little tent and provisions—a loaf of brown rye-bread, two tins of potted meat, a diminutive keg of schnapps, and rations for my companions, the student Stefán and Gísli Skulk. The latter showed some alacrity in preparing to return home; as he had a grudge against Mr Lock, so he contrived to nobble all the ropes, and tried furtively to drive off all the baggage-horses. I looked carefully to the tethers of my nags, and personally saw them shod with good irons and new-made nails: I strongly suspect my henchman of having stolen a march upon me; he could not smash my hammer, but he managed to lose the extra nails. More than one shoe proved to be broken on the second day, and several were found fastened with only three mere "tacks," the best contrivance in the world for permanently injuring a hoof.

The start was, as usual, painfully slow; although I rose at five

A.M., the journey did not begin before 10.30. The Messrs Lock accompanied me part of the way; we were all to meet at Djúpivogr on the seventh day, but that meeting was not written in the Book of Fate. After shaking hands with the good Bowers, I pricked sharply over the plain, glad to escape the reeking valley of Mý-vatn; the cool and clear north-easter at once swept away the mournful *grisaille* of the charged sky; presently the sun came out, afflicting the horses, and the dust rose, troubling the riders. About half-way to the river we turned off south-eastward, and rode over the usual mounds, which resemble

"The grassy barrows of the happier dead."

After this rough, tussocky ground came black sand, bordering black and ropy lava; the former was grown with oat-clumps seven to eight feet high, many of them dead at this season: they sheltered the normal vegetation, and extended immense roots to collect nutriment from the barren soil. The path was pitted, especially on the outskirts of the various stone-floods, with blind holes (Gjá), wearying, and even dangerous, to horses—I soon preferred the rougher riding. The floor-rock again was yellow Palagonite, barred with white waves, soda and potash. At four P.M. we crossed the Fjallagjá, a yellow wady, which might have been in the heart of Arabia Deserta; we were approaching its recipient, the foul Jökulsá. Finally, after entering broken ground of deep sand, and crossing a black hill, Gleðahús, the gled's house, we come to our halting-ground, Valhumall-lá,[1] the "low land of milfoil," another wady, but black with sand, and showing lava-streams to the south. The guide declared that we were on the parallel of Víðidalr, which, however, could not be seen.

The day's work had been thirty-two miles, in six hours twenty minutes, and I was much pleased with it; no better proof was wanted to show the feasibility of travelling in the wilderness, at least wherever a river is found. All the features have names given during the annual sheep-hunts. We found tracks of the

[1] The Dictionary gives Lá, surf, shallow water along shore; and hair (Lanugo). I found it extensively used to signify a low place where water sinks, the Arab's "Ghadir."

flocks and the ponies which had followed them, extending up to the Vatnajökull. To the south-west, and apparently close at hand, rose Herðubreið: viewed from the north, its summit, which is tilted a few degrees to westward, appears like a cornice perpendicular, and in places even leaning forward, whilst a solid conical cap of silvery snow ends the whole. In the evening air the idea of an ascent looked much like mounting upon a cloud; the more you craned at it, as the phrase is, the less you liked it; but I trusted that a nearer approach would level difficulties, and that the sides must be striped by drainage *couloirs*. The cold became biting before eight P.M., another reminiscence of the Asiatic desert, in which you perspire and freeze, with the regularity of the tides, every twenty-four hours: in both cases the cause is the exceeding clearness and dryness of the atmosphere, so favourable to the radiation of heat and to the deposit of dew. I slept comfortably in the tent pitched upon the sands, disturbed only by Stefán's hearty snores.

August 11.

The day broke badly indeed: at early dawn (aner., 28·55; therm., 41°) a white fog lay like wool-pack on the ground, making the guide despair of finding his path: at nine A.M. it began to lift, promising a fiery noon, which, however, was tempered by a cool north breeze. The men persuaded me to leave the tent; there are no thieves in the Icelandic desert, in this point mightily different from that of Syria: they declared that we should easily reach Herðubreið in two to three hours. We presently crossed a new lava-stream, the usual twisted, curled, "tumbled together," and contorted surface, in places metallic and vitrified by fire; here and there it was streaked with level, wind-blown lines of dust and ashes. Thence we passed into the usual sand, black and cindery, based upon tawny Palagonite, and curiously beached with pebble-beds; the rounded stones had been scattered on the path by ponies' hoofs. This sand was deeply cracked, and our nags, panting with heat, sank in it to the fetlock. The maximum of caloric at certain hours of a summer's day during a long series of years is far more equally distributed over earth than men generally suppose. Some have gone so far as to assert that it

is "the same in all regions from the Neva to the banks of the Senegal, the Ganges and the Orinoco;" and the range has been placed between 93° and 104° (F.) in the shade. In this island we are preserved from extremes by the neighbourhood of the sea, yet the power of the sun at times still astonishes me. The "Ramleh" (arenaceous tract) ended in a pleasant change, a shallow, grassy depression, with willows, red and grey, equisetum, "blood-thyme," wild oats, which abhor the stone tracts, and the normal northern flora. Here, as I afterwards found, we should have skirted the Jökulsá, made for the mouth of the Grafarlandsá, and ridden up the valley of the dwarf stream. The guide preferred a short cut, which saved distance and which lost double time.

To the right or north-west we could trace distinctly the golden crater, the Sighvatr pyramid, and the familiar features of the Fremrinámar. I again ascertained that a line of high ground, a blue range streaked with snow, trending from north-west to south-east (mag.), and representing the fanciful Trölladýngjur (*Gigantum cubilia*) of the map, also connects Bláfjall with the Herðubreiðarfell. The latter, separated by "Grave-land Water," a common name for deeply encased streams, from the "Broad-Shouldered" proper, is a brown wall with frequent discolorations, a line of domes and crater cones, now regular, then broken into the wildest shapes; in one place I remarked the quaint head and foot pillars of a Moslem tomb. A single glance explained to me the ash-eruption from the Trölladýngjur recorded in 1862, and the many stone-streams supposed to have been ejected from Herðubreið; they extended to the very base of the latter, and all the "Hraunards" (lava-veins) which we crossed that day had evidently been emitted by these craters.

At noon, after four hours fifteen minutes (= fifteen very devious miles), we entered a line of deep, chocolate-coloured slag and cinder, unusually bad riding. It presently led to the soft and soppy, the grassy and willowy valley of Grafarlönd, which is excellently supplied with water. I naturally expected to find a drain from the upper snow-field of the Great Cone; the whole line is composed of a succession of springs dividing into two branches, a northern, comparatively narrow, and a southern, showing a goodly girth of saddle-deep water. The weeds of the

bed and the luxuriant pasture amid the barrenest lava, "Beauty sleeping in the lap of Terror," suggested that in this veritable oasis, if anywhere, birds would be found. A single snipe and three Stein-depill[1] (wheat-ear) showed how systematic throughout this part of the country had been the depopulation of the avi-fauna. A few grey-winged midges hovered about, but I looked in vain for shells. The spring showed only a difference of + 0·5 from our sleeping-place. And now my error began to dawn upon me: the ride to Herðubreið would be seven hours instead of two to three; the tent had been left behind; the men had no rations, and "alimentary substances" were confined to a few cigars and a pocket-pistol full of schnapps.

But regret was now of no avail; and time was precious. After giving the nags time to bite, I shifted my saddle, and, at two P.M., leaving Gísli Skulk in charge of the remounts, I pushed on south, accompanied by Stefán and Kristián. We crossed the two streamlets, each of which has its deeper cunette, luckily a vein of hard black sand. Beyond the right bank of the Grafarlandsá we at once entered the wildest lava-tract, distinguished mainly by its green glaze, fresh as if laid on yesterday. It was like riding over domes of cast-iron, a system of boilers, these smooth or corrugated, those split by Gjás and showing by saw-like edges where the imprisoned gases had burst the bubbles: near the broken cairns we found lines of dust which allowed the shortest spurts; the direct distance to Herðubreið was not more than two miles, but the devious path had doubled it. Again we had been led by the worst line; on our return, Kristián, having recovered his good temper, showed us a tolerable course. He frequently halted, declaring that his master had forbidden him to risk the nags where the Útilegumenn might at any moment pounce upon them.

At 4.30 P.M. I reached the base of Herðubreið, and found it, as was to be expected, encircled by a smooth, sandy, and pebbly moat, a kind of Bergschrund, whose outer sides were the lava-field, and whose inner flanks formed in places high cliffs and

[1] Depill is a spot or dot; a dog with spots over the eyes, according to the Dictionary, is also called "Depill." Cleasby translates Stein-delfr (mod. Stein-depill) by wagtail, *Motacilla*.

precipices. The formation at once revealed itself. The Broad-Shouldered mountain is evidently only the core of what it was. Its lower part is composed of stratified Palagonite clay, which higher up becomes a friable conglomerate, embedding compact and cellular basalt, mostly in small fragments. The heaps at the base are simply slippings, disposed at the natural angle, and they are garnished with many blocks the size of an Iceland room. Above them rise the organs, buttresses, and flying buttresses, resembling pillars of mud, several exceeding 300 feet; the material assumes the most fantastic shapes: in one place I found a perfect natural arch resting upon heat-altered basalt. The heads of the columns form a cornice, and from the summit of the cylinder an unbroken cone of virgin snow sweeps grandly up to the apex. Evidently the Herðubreið is not the normal volcano: it may be a Sand-gýgr after the fashion of Hverfjall, but of this we cannot be assured until the cap is examined. The chief objection would be the shape, the reverse of the usual hollow.

Leaving Kristián in charge of the horses, I attacked the slope in company with Stefán, from the north-east, and we gradually wound round to the east of the cone. The slopes were clothed with small and loose fragments of basalt, making the ascent difficult. Here rain-gullies radiated down the incline; to the south-east yawned a great *marmite*, a breach probably formed by a long succession of clay-slips and avalanches. The adhesive snow clinging to the rough conglomerate lay in fans and wreaths even against perpendicular walls, whereas in Europe large masses cannot accumulate at an angle of 45°, and the meteor is unstable and apt to break away when the angle exceeds 30°; here it seems plastered upon the steepest sides, looking from afar like glistening torrents. After seeing the huge *névé* which clothes the mountain from the shoulders upwards, I was surprised to find that, although the ascent was broken by huge gullies which in spring must discharge torrents, the flanks are absolutely waterless; as on Western Snæfell, the drainage sinks through the porous matter and, passing underground, reappears in springs upon the plain, a familiar feature to the traveller in Syria. Yet the slopes carried the usual Iceland flora, of course shrunk and stunted by the cold thin air. I picked up the vermi-

form earths of some wild animal, which crumbled to pieces in my pocket: the farmers recognised the description, declared that they knew them well, but could not tell me what the creature was. None would believe me when I assured them that Herðubreið was a formation of "Mó-berg."

As we approached the upper pillars the lowlands lay like a map before us. Hard by the south-eastern foot sat the little tarn Herðubreiðarvatn, surrounded by soft mud, instead of rush and reed: the Vatn has no outlet, but it is perfectly sweet. Farther north there is a streamlet flowing, like the Grafarlandsá, through patches and streaks of green: it rejoices in the name of Herðubreiðarlindá, the "river of the spring of the Broad-Shouldered." Beyond the blue cone Jökullsclidá—I am not sure of my orthography—which rises to the south-east, the Great Jökulsá, after broadening into apparently a shallow bed, forks, divided by a lumpy ridge, the Fagradalsfjall, which we had seen like a blue cloud from Möðrudalr. It has the appearance of a ford, but Stefán assured me that the farmers are deterred from crossing it by quicksands: this was afterwards contradicted. The eastern branch, lying upon a higher plane, again splits, enclosing the Fagridalr. On the "Fair Hill," and in the "Fair Dale," where outlaws are said formerly to have mustered strong, sheep from the eastern farms are fed upon the very edge of the Ódáða Hraun. We had an admirable study of the Kverk and the (Eastern) Snæfell, making the student remark that he was close to his home at Bessastaðir. As the sun sank, the peak projected a gnomon-like shadow on the plain, an affecting reminiscence of the Jebel el Mintar, which acts dial to "Tadmor in the Wilderness."

After an hour and a half of very hard work, for we had scrambled up nearly 2000 feet (aneroid, 26·60; thermometer, 35°), we reached the mud-pillars, and serious difficulties began. My *camaro*, who walked pluckily enough, could mount no more. I had taught him the rule of volcano-climbing on stones and descending on cinders; of using the toes when going up and the heel when going down; and the consequence was that his Iceland slippers and stockings were clean worn away, and in a few minutes his feet would be cut. I left him and sought a *couloir*,

which by careful "swarming," might have opened a passage. But here a new difficulty was added to ever-increasing darkness and to numbing cold. In Switzerland the rock cannonades are most frequent between midnight and dawn: here the blocks of basalt, detached by the leverage of sun and frost, begin to fall as soon as the temperature lowers. The *couloir* was too narrow for swarming up the sides, which are less risky than the centres. After three narrow escapes, in one of them my right hand saving my head, I judged that the game was not worth the candle. Though close to the snow (aneroid, 26·55), it would have been impossible to reach the summit alone, in the night and over an unknown field.

Descending in double-quick time—"devouring space," as Belmontel says—we soon reached the moat which separates the castle from its outworks of lava, and refreshed ourselves at the little tarn. During the descent I observed a feature, before hidden from view; a lumpy tail with two main bulges prolonging Herðubreið to the south-west: perhaps the next attempt might succeed if this line be followed. From the Herðubreiðarvatn we took the south-eastern line, where the lava-field was by no means so horrid. After an hour, striking the Herðubreiðarlindá, also an influent of the Jökulsá, we hurried down the right bank, frequently crossing when the soft and rotten ground threatened to admit the ponies. Finally, we traversed in fifteen minutes a divide of lava, we forded the double channel of the Grafarlandsá, and at 9.45 we were received with effusion by the solitary Gísli. Those who follow me will do well to ascend the left bank of the Jökulsá, to trace the Grave-land Water to its source, to pass over the lava-breach, and to follow the Lindá where it rises from the plain.

The day's ride had occupied nine hours thirty minutes, and the unfortunate "tattoos" were not prepared for some four more: moreover, *les genous m'entraient dans le corps*, as the *gamin* says. The blood-red sunset promised a fair night, free from wind and fog, and, although we were some 1400 feet above sea-level, a bivouac in the glorious air of the desert under

"Cette obscure clarté qui tombe des étoiles,"

could not be considered a hardship. No one thought of a fire

till I set the example of collecting willow-roots, and then all, beasts as well as men, were greatly comforted by the short, sharp bursts of blaze. The poor fellows offered me a share of their only viaticum, a bit of bread and sausage, but I saw by their longing, hungry eyes that their necessities were greater than mine. A blanket instead of the oilskin from my saddle-bag would have been a comfort; but even without it I slept like *un bienheureux*, and awoke lively as a lark. What a different matter was my night in the open below Fernando Po peak!

That morning I had set out to "plant a lance in Iceland," by mastering the Herðubreið; for once utterly deceived by the clearness of the air, I had despised my enemy, and he got the better of me—the general verdict will be, "Serve you right." My consolation was that, though beaten, I had hardly been fairly beaten; the fog was not to be controlled; the guide led us by the worst paths, and we crept over lava after expecting to move fast. The altitude is laid down at 5447 English feet above sea-level; and as we rode up to the base, about 1500 feet high, there remained only 4000 feet, which would not have taken more than five hours. Such was my calculation, and it erred by being drawn too fine. Nor could the attempt be renewed next day. I had promised to send back to Mr Lock my only companion, Stefán, whose foot-gear was in tatters; Gísli and Kristián would have seen me in Ná-strönd, the shores of the ignoble "straw-dead," rather than accompany me over an unknown snow-field, and such climbing must not be done single-handed.

Section II.—Return to Valthiófstaðir and Stay There.

August 12-16.

There is little to say concerning these five days, which were spent in returning to Valthiófstaðir by devious ways. On August 12th the world, according to local belief, was to have been destroyed; knowledge has increased since A.D. 1000, so no one made preparation, spiritual or material, for what Hindus call the Pralaya, hourly expected by primitive Christianity. *Je m'en moque comme de l'an quarante* (1740). At three A.M. we rode down the

cold valley of the Grafarlandsá, picked up the tent, and bidding adieu to the good Stefán and the miserable Kristián, we reached the Jökulsá ferry after a total of six hours forty-five minutes. The blood-red sunset had kept its promise till clouds rolled up from the south, and I have seldom had a more thorough dusting.

At early nightfall suddenly appeared Mr Pow and his guide, Jón Pèturssón, son of the old priest of Valthiófstaðir: they had been paying a visit to Mý-vatn, and now they were hastening home for a wedding. The former had been making inquiries about sheep-farming; he believed that, in that line, something might be done whilst the pony traffic was thoroughly worked out. Farms ranging from $3000 to $6000 are readily bought throughout this part of the country. As the snow begins upon the Heiðis in November, lies deep in December and January, and lasts till May, it would be necessary to allow one ton of hay per thousand head, and the import price, excluding freight, must be computed at £2, 10s. rising to £4. He was sanguine enough to expect a cent. per cent. profit: I never heard that the project had any results.

Next day we started betimes in the cool east wind, which presently chopped round to the south, and gave us a taste of Sind and the Panjáb—all the sand of the Arabian desert seemed to be in the air, and it was the sharpest of its kind. We enjoyed a headlong gallop not unworthy of the Argentine Pampas, halted a few minutes at the Möðrudalr oasis, and pressed on to Vetur-hús: here we parted as I wished to examine the lake region, and to inspect the Brú of the Jökulsá.

On the next morning, which, after the stillness of dawn, also obliged me with a dust-storm, I set out at eight, rounded the swamps and black bogs, and, after crossing a marshy divide, entered the valley between the Eiríkr and Thríhyrning hills. The land is poor, but it manages to support two little Sels. At last we came upon the Thverárvatn, the southernmost of the tarns, and following the right bank of its drain, the Thverá,[1] we reached the Brú after an hour and a half's hard riding. It still

[1] Thverá, the "thwart-water," from Thver, Germ. Quer, and Eng. Queer, is generally translated Crooked River, Rivière à travers: the term is often applied to a tributary which strikes the main stream at a right angle.

preserves the traditional name although the natural arch of rock fell in 1750: in Henderson's day it was succeeded by a wooden bridge, and now there is only a cradle. Horses are forded about a mile up stream, where the break becomes a broad, split by holms and sand-banks. The seedy little chapel of Brú wants cross and steeple: it is built of turf, like that of Mý-vatn.

We left the river at 10.30 A.M., and resolved to inspect the Aðalbólsvegr, the southernmost road across the Heiði. It begins by crossing a divide, after which, rounding the Vaðbrekka, or ford-ledge hill, it ascends the dusty valley of the Hrafnkelsá. Two farmlets, Vaðbrekka and Aðalból,[1] the latter with four gables of wood and turf, and backed by Laugs of warm water, hug the left bank. After fording the stream thrice we walked up another divide, where the path was cobwebbed and all in holes—these "dead roads" are by no means pleasant travelling. The upper plateau was, like the northern line, the usual scene of standing waters and flowing waters, especially the Höllná and the Heiðará; all these soppy black beds are named, but none appear in the map. The list of this day's birds comprised a few snippets, three ravens, and a couple of whoopers (*C. ferus* or *C. Bewickii?*) which travellers often mistake for sheep. It was not my fate in Iceland ever to hear the sweet song of the swan, which borrows an additional charm on dark wintry nights from the popular belief that it promises a thaw; the poetical fancy of its being a death-lay seems here unknown. The descent to the Fljótsdalr occupied half-an-hour, and after seven hours forty-five minutes of rough riding from the Brú I reached Valthiófstaðir, where they did not expect me before nightfall.

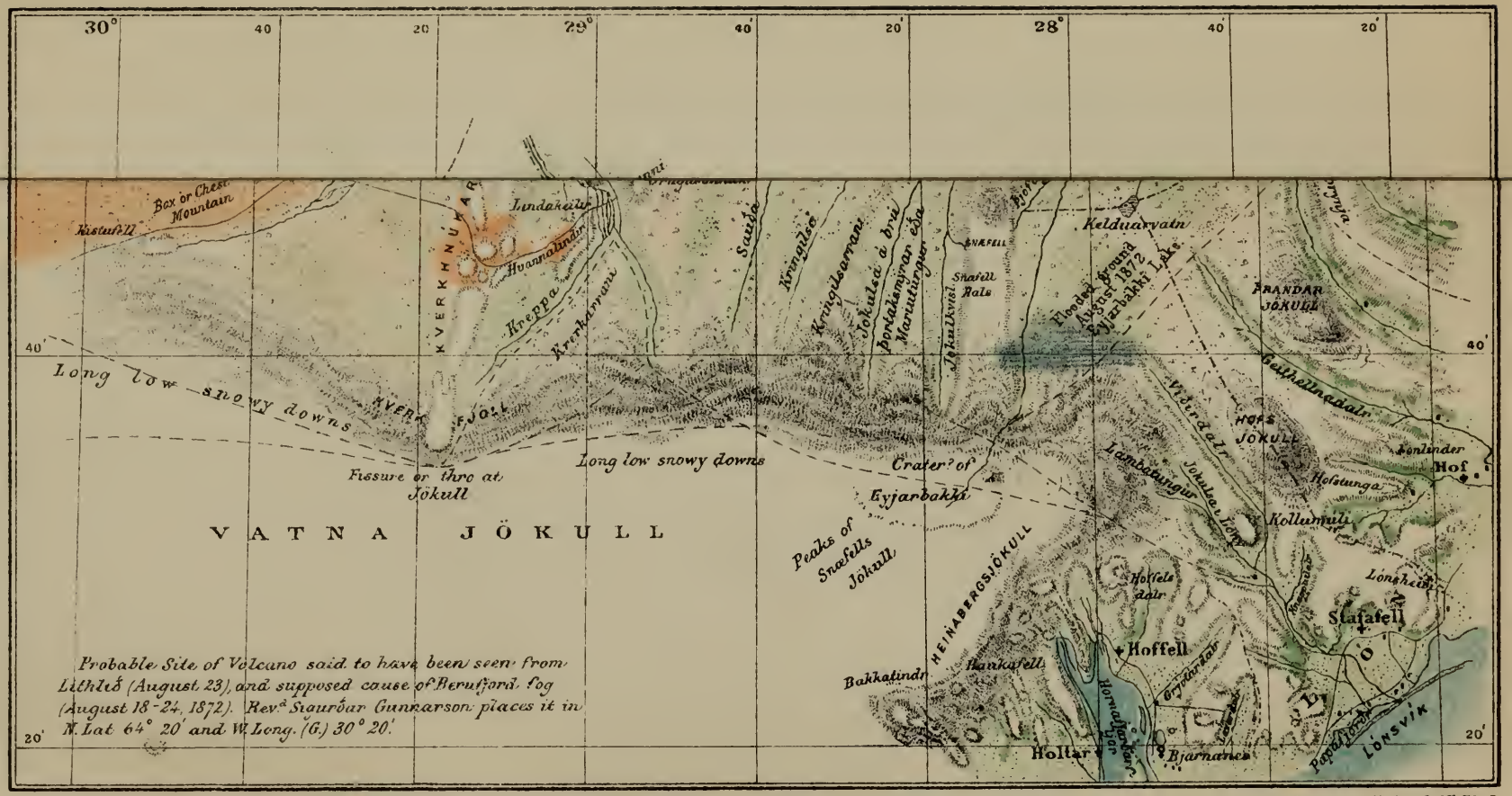
There was revelling at the parsonage, and though I missed the howling of hymns and hollaing of anthems, the splendid "upholstering" of the girls, and the starry veil which takes the place of orange-flowers, I was in time for the feast. The daughter of the house, a notably good manager, was the bride; the bridegroom was a well-to-do widower of eighteen months' standing. Hr Nikólás Jónsson had learnt joinery at Copenhagen, and found his handicraft pay well at Seyðisfjörð. Ponies, with all manner of

[1] Aðalból is a manor-house, a farm inhabited by its master, opposed to a tenant farm.

gear, including the "handsome brass woman's saddle" of a certain English traveller, filled the stables, or browsed about the tún, showing a goodly gathering of relatives and friends; even Seyðisfjörð sent forth its contingent. Those who had dined were chatting and "touching pipes" on the green: despite my garb being the reverse of a wedding garment, I was hospitably pressed to join the second detachment. After we had satisfied hyperborean appetites, the speeches began, prefaced by loud cries of "Silentium!" As many of the orators were priests and students training for the priesthood, few could plead "unaccustomed to public speaking," and most of them acquitted themselves remarkably well. Mr Pow, after delivering his sentiments in English, sprang out of the window to prepare for a wild ride; I aired my Latin, concluding with an effective sentence, "Deus sit propitius his potatoribus"—of course ignoring Walter de Mapes. Having talked ourselves "dry," we installed a "magister bibendi," and fell to with a will; we were loud in our mirth "as the Ritur (tarrock-gull) on the rocks," and the bottles of Cognac and rye-brandy required repeated replenishing, till the small hours sent us to bed. The newly-married couple slept at home, and next morning, after coming to breakfast, they took horse and went their ways.

At Valthiófstaðir I was fortunate enough to meet Prófastr Sigurður Gunnarson of Hallormstaðir, whose name has already been mentioned. A portly, good-looking man of sixty, hardly showing fifty, he is a good Latinist, and his genial manners make him a general favourite. He first accompanied Professor Gunnlaugsson in 1832 to the Vatnajökullsvegr, and since that time he has made three trips to the northern edge. He gave me the position of the volcano (N. lat. 64° 20′, and W. long. G. 30° 20′), which appears upon the map. When told that Herðubreið was a mass of Palagonite, he declared that he had seen Mó-berg at Lomagnúpr and other hills of Sera and Floskeldar; moreover, that he suspected it to be the constituent of the Kistufell and the Kverk, which he had passed in the dark. He assured me that he had found the Western Jökulsá easily fordable after its fork, where it is called Kreppa, or the Squeezer.[1] Among other places which

[1] From the verb Kreppa, to cramp, clench. The map gives the name to the eastern headwaters of the Jökulsá, rising from the Kverk.



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William P. Nimmo, London & Edinburgh.

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William P Nimmo, London & Edinburgh

are shown by the map, he mentioned the Lindákeilir (fountain-pyramid) with its two springs, the northern cold, the southern hot; the Hvannalindir, rich, as the name shows, in Angelica; and the Kringilsá, or encircling water.

The morning after the feast was spent in breakfasting, in chess-playing, and at cards, with coffee-beans for counters: on this occasion the men ate first, and after them the women, somewhat after the fashion of the Druses: the parson's wife also waited, like an "Oriental," upon her younger brothers. The friends mounted their stout nags, and disappeared after the normal salutations: amongst them was the Prófastr, with coarse woollen stockings sensibly drawn over his shoes. The kith and kin waited till two P.M. on the next day, and, when the heartiest and smackingest of busses had been duly planted upon projecting lips, all rode off, escorting the bride and bridegroom, and escorted by the family *honoris causâ* as far as the next farm. Mr Pow had agreed to join me in attempting the Vatnajökull; but, whilst I remained to collect provaunt and to avoid the heavy weather which threatened, he resolved upon a preliminary trip, with the prime object of shooting a reindeer. He hired for $2 an old round-ball Enfield from the farmer-ferryman of Bessastaðir, who, apparently convinced of the Enskimaður's insanity, snatched it three times out of his hands, till he received a watch in pledge. The solitary march was hardly to be recommended. About the Vatnajökull fog or snow may cover the world at any moment, even in July, the best month; and dozens of sheep are often killed by a single violent storm. Mr Pow set out early on the 15th, missed the road, and returned at eleven A.M. on the next day, thoroughly dazed, and apparently unable to give any account of his march—Jón Þèturssón's eyes filled with tears at the sight. That trial proved sufficient for my intended companion, who, as soon as his two nags could move, set out for Seyðisfjörð.

The weather, which had been surly and wrathy for some time, could no longer restrain its rage: the afternoon (August 16) was bad, and the evening was very bad. The day sped wearily watching the cloud-battalions as they scaled the seaward hills: here this easter and deflected norther brings heavy rains and thick raw mists; the souther and the south-wester are little

better, and men rely only upon the western wind, which comes from the arid lavas and sands of the Ódáða. The night was one long howl of storm; "drip-drip" resounded from the church floor, and the wind flung itself against the building, threatening to bear away the frail steeple into space. Huge black nimbi, parted by pale and sickly gleams, ever greeted my sight as I gazed in sorrow from the casement of my ecclesiastical lodging. But joy came in the morning: first a glimpse of blue sky between the flirts of rain, then a sign of the sun. The river was reported to be rapidly filling—never mind, unlucky Friday has passed by, and we may look for better things on Saturday.

The provisions, bread, meat, and cheese ($3), with the unfinished keg of schnapps, were awaiting our departure. But Stefán Pèturssón, who was to accompany me, had fallen ill, the malady being probably that popularly called in India a "squiffy quotidian:" so I engaged as guide the student Thorsteinn, who had led us to Thorskagerði, paying for him and his nag $3, 3m. 0sk. per diem. Gísli, the "coal-biter," when drawn badger-like from the kitchen, again tried to shirk, pleading the weakness of the ponies, but a threat to withhold wages reduced all opposition to a slackness of the knees, a settled melancholy, and a hurt-feeling expression of countenance. This time he was never left alone with the horses after they had been shod: he presently revenged himself by displaying an amount of appetite which threatened the party with starvation, if it lingered in the wilderness a day longer than he liked.

Section III.—The Ride to Snæfell: View of the Vatnajökull.

Saturday, August 17.

I managed to draw the sleep-thorn from Gísli's ears and, after the usual silly delays, to set off at 9.45 along the left bank of the Fljótsdalr, *alias* the Norðurdalr: the wind was still southerly, clouds came from the east, but the aneroid was rising and the sun was taking the master's place. The broad trap valley sup-

ports, on either side, many farms and Sels; Glúmstaðir, Hóll, Thuriðarstaðir; the large Egilstaðir, highest on the map, reached in two *orette;* and Kleif, with its Sætur and backing of western hill. The angry stream is crossed in many places by ropes and cradles; gradually it becomes a torrent-gorge, and the whole length receives a least a dozen rain-bred cataracts: everywhere we saw their smokes and heard the dull charge of cavalry, whilst the rattling of stones upon the sandy beds sounded like the distant pattering of musketry. There was, however, no difficulty in crossing the mouths and, after three hours fifteen minutes of mild work, we rested the nags and changed saddles at the sheep-house of Kleif.

Beyond this point the torrent-gorge is impracticable, and we ascended the rough, steep left bank, whose lower levels were garnished with stunted birches: it led to the monotonous Heiði, which I had now passed thrice. The streams on this line were more troublesome, owing to the slippery crossings of sheet-rock. We forded the Stóri-lækr (big rivulet) four times, and twice the upper waters of the Öxará above its ugly little cataract in a dwarf valley. A short tract of sandy, willow-grown ground led to the Laugará, which was girth-deep. Riding down its right bank, we came to the Laug, which much resembles that of Reykjavik: the waters show boiling point at the source, and 115° (F.) a few yards below. It lies on the north-eastern slope of Laugarfell, and nearly due east (mag.) of the pointed black cone Hafrsfell: these two detached hills, disposed upon a meridian, are mere outliers of Snæfell. Fifteen yards west of the Laug is the Laugarkofi, or the Warm-spring-cell, a hut some 7 feet by 6, with dry stone walls sunk two feet in the ground: the raftered roof is supported by a central post, and made tight with turfs. We were happy to find it in repair. The weather again broke, and a Scotch mist settled stubbornly upon the dreary landscape; the aneroid showing 27·60, and the thermometer 38°. Our day's march had lasted only five hours fifteen minutes, and on return we easily covered it in three hours fifty minutes. The night in a warm and (comparatively) clean nest, with the howling wind outside, would have been delightful, but for misgivings about the morrow.

August 18.

I rose at dawn with no little anxiety; in these altitudes man is wholly dependent upon weather: it is like a Polar expedition on a small scale. The rainy and windy night had cleared the air, and the sun rose bright, bringing with him a stinging and intensely dry[1] south wind from off the Jökulls. The baggage pony was loaded, and all preparations were made by 8.45. We began with the rotten and boggy ground, draining the Snæfell and its north-eastern outliers to the Jökulsá. Here began the trouble which lasted more or less throughout the morning. The surface is cut by gullies and earth-cracks, often twenty feet deep, and varying from a yard to ten yards in breadth. Few could be leaped by untrained animals, and the many which could not be crossed caused detours either up or down, often a furlong to cover a perch. The smaller sort were the most troublesome, owing to the badness of the take off and landing: the nags made themselves ridiculous in attempting to scramble over, with their hind legs in the hollows, whilst the forehand was holding on the farther bank. In the worst places, at least one of the caravan was sure to be sprawling upon the ground. The best parts were the stony spots, and the medium were the swamps, especially where Fífa and bright mosses spangled the ground.

The wind now veered to the south-west, and after two hours we easily forded the Hafrsá, a drain rising in the south-east of its "fell." The latter, seen from the eastward, proves not to be a single cone, as the map shows; behind the knob lie a jagged, saw-toothed ridge and sundry outliers. At a distance, it appears to be lava, but when riding over it in the afternoon I noticed that such form of erupted rock is wholly absent from this line. The material, like that of Herðubreið, is Palagonite, which doubtless forms the base of the northern Vatnajökull. Unlike the basaltic conglomerate of the Broad-Shouldered, however, it is puddinged with cinders reddened and charred by the flames. The colours are ruddy, black-brown, chalky-white, green, and yellow, the two latter extending in a band through Snæfell from

[1] The experiments of M. J. M. Ziegler of Winterthür show the drying power of ice; a difference of 32° per cent. humidity in the glacier air and in the air of the adjacent plain.

R. F. B. *delt.*

VIEW OF THE VATNAJÖKULL FROM THE SOUTHERN SLOPE OF (EASTERN) SNÆFELL.

south-west to north-east. Scoriæ also are scattered upon the sand, and these, with a strew of basalt, make up the sum of the surface rocks.

At noon we forded the Thjófagilsá (water of the thief's gil) below the little waterfall dashing down columnar basalt, and we halted near the Hálskofi, a hut like the nest near the Laug. After half-an-hour we resumed our ride along the eastern flank of Snæfell, which greatly altered in shape. The first view (August 2) from the heights above Hallormstaðir showed a Háls or *col* to the north, in fact the Snæfellsháls of the map, which should be countermarched to the south: "Snowfell" also seemed attached to the Vatnajökull by a long Rani, or tongue of raised ground, to which it acts tip: this must be changed for lowland and lake; and the shape suggested climbing on the western side, where it is almost perpendicular. Viewed from the north-west (August 14), Snæfell hill assumed a sphinx shape, the hindquarters being like those of Herðubreið to the south.

Snæfell projects to the north-north-east, or above our path, a long clean *arête* of yellow Palagonite, flanking a great fissure: the lower parts are here snowy, the upper are revetted with dark conglomerate. Behind, or to the west of this ridge, is a large snow-field, one of the many buttresses, extending to the flat-topped summit. We ascended stony ground when working to the south; and here an unpleasant surprise awaited me. Instead of the clear course of the little Jökulsá draining the peaks and pins of the Snæfellsjökull, a northern section of the Vatnajökull, the whole expanse lying between the glacier and the height upon which we stood formed a broad and apparently shallow lake, in part composed of clear pools, and the rest of muddy veins. At its head is a great depression in the Jökull, marked eastward by Eyjarbakki (island bank), a black cone, which may be a crater. The delta-shaped mass of water projects its point to the north, where we can distinctly see it falling over the Eyjarbakka-foss into the Jökulsá gorge. This formation may be temporary, dry ground flooded by the late rains: the farmers, however, know it by the name of Eyjarbakka-vatn. Permanent or not, it was utterly impassable without boats, whilst the Jökulsá was too full to be forded.

A near view of the Vatnajökull, from the south of Snæfell, confirmed my previous impressions. The snowy base-line is formed by the descending angle of the wind: this must explain how all is congealed at a height where Snæfell is free from frost (aneroid, 27·75): perhaps the thrust from behind may perpetuate the *névé*. Beyond the long white wave, pure ermine above, and below spotty like a Danish dog, stretching far to the west, rose the quaint form of Kverk, the throat or angle beneath the chin,[1] with two big, blue buttresses to the east: the black outlier of conical shape has a deep gullet to the north, vomiting a light-blue glacier upon the snow-fields lying at the base; it is prolonged north by the Kverkhnúkrrani (snout of the gullet-knoll), apparently containing two distinct patches of volcanic aspect.

Resuming our ride to the west over the true Snæfellsháls, whose stony flanks delivered us from bog and earth-crack, we found that even here the summer pasturages are not unused. The dandelion and the violet, dead elsewhere, still enjoyed the autumn of life; sign of reindeer was seen in two places, and we flushed sundry coveys of ptarmigan. A couple of ravens and a snow-tit composed the remnant of animal life; happily for us the midges were absent.

At two P.M. we reached our farthest southern point, the long dorsum which prolongs Snæfell southwards to the Snæfellsháls. On the far side of the *col* rose Thjófahnúkr, a big, black, cindery cone, like the rest. Between it and the northern hypothenuse of the Vatnajökull lay a dark saddleback, with all the appearance of a volcanic crater; the absence of lava may be explained by its vomiting, like Hverfjall and Herðubreið, cinder and ashes. As we turned up the Thjófadalr, between the Thieves' Knoll and the Snæfell proper, the ice-wind struck full on our backs. The amphitheatre was girt on both sides by jagged, rocky peaks, like the edges of bursten bubbles and blisters; and the shoulders of Snæfell projected to the south-west, a sharp ridge and a cone of warm-yellow Palagonite — here the ascent would have offered no difficulties. This part of the valley discharges to the south

[1] Thus in the dictionaries; but it seems to have another sense in popular language.

many streamlets of melted snow, some clear, others of white water. Crossing the divide, we struck the Hrafnkelsá, which is prolonged by the Jökulkvisl and the Sauðará (sheep-water) to "Jökulsá of the Bridge." The line presently became a deep and grisly gorge of black and copper-coloured Palagonite; and we passed sundry long bridges of hard snow which were excellent riding. So far I can confirm the experience of the French naval officers, who assured me that in Iceland these formations, so redoubtable farther south, offer no risk.

At four P.M. we halted for an hour at the head of the Eastern Jökulsá, quietly enjoying the warm western exposure. From this point there was an extensive view of the river-drained plain which, broken by detached lumps of hill and broken ridges, separates Snæfell from the eastern edge of the Ódáða Hraun. When the nags had enjoyed a bite we resumed the descent of the deep and broken river-valley that passes between the Hafrsfell and its western outliers: the buttresses and banks of loose wind-blown sand descended bodily with our weight. Again we saw a spine of Palagonite, showing a fair ascent to the upper snow-field; and we looked in vain for the delicate ripple-marks which from a distance betray hidden crevasses. Here the surface material melting in the sun sinks into the lower strata, making the whole a solid mass—hence the glacier growth which exists in Greenland, and which is suspected in Iceland. As we rode under the precipices of North-western Snæfell, the snow, sliced off as if by a razor, forms a wall some fifty feet thick, soft above, and below pale-blue, like the Blaabreen of Norway, where hardened to ice by excessive pressure. This fine "snout" showed a few thin ribbons, but nothing like "veined structure," that vexed subject of the glacialists. The whole "snow-fond" for perfect beauty wanted only the lovely background of mazarine-coloured skies to be seen in more southern latitudes.

At six P.M. we forded the Hauká (hawk-water), one amidst a score of shallow, bubbling, pebbly streams, random rivulets, which the afternoon heat was setting free from the vast sheets of snow. Beyond Hafrsfell we recognised with disgust the sodden, rotten ground of the morning, and the weary ponies so lost their tempers that they seemed unwilling to rise after the

frequent falls. Yet I could not but admire the pathos, the strange double nature of the wild prospect. Here it was a hard and uncompromising photograph, a weird etching by Rembrandt or Doré, in which, from the vivid whiteness of the snow and the blackness of the rocks, the far appeared near: amongst the chaotic rubbish heaps there was no shadow within shadow, no dark as opposed to a light side. There, beyond a middle ground of steely blue plain, lay a "lovely Claude," a dream-landscape of distant Jökull. The delicate tints, cool azure-white and snow warm with ethereal rose-pink, seemed to flush and fade, to shift and change places, as though ghostly mists, unseen by the eye of sense, were sailing in the pale beryl-coloured sky. Anon the sun sinking towards the hilly horizon rained almost horizontal floods of light, transfiguring the scene with golden glory as every feature kindled and lit up with a peculiar freshness of expression —a region so calm and bright did not seem to be of this world. Yet a few moments more and its rare spiritual loveliness, passing through gradations of matchless tenderness, began to fade; the pale-grey shadow came, "stealing like serious thought o'er joyous face," and all disappeared in the dark nothingness of night. These splendours of the Trolls' home were well worth a journey to the "Brumous Isle," but the long search and the short fruition almost tempt me to "point a moral."

After some ten hours' hard work for man and beast, we were cheered by the steam rising from the Laug, and we again thanked Iceland for laying on such plenteous supplies of hot water. The memory of the last touching view, with its "wild beauty of colouring," moved me to issue, about midnight, from the nest and to compare the dark with the light hours. But the moon and stars seemed to count for nothing in that "inspissated gloom." The scene was

> "All ruined, desolate, forlorn, and savage."

The deepening glooms made the silence something more oppressive—τῆς σιγῆς βάρος—than the mere negative of sound; it became an indescribably awful presence, weighing on and deadening to the spirit as the sense of utter solitude—even the nasal music within the Laugarkofi was a positive relief. I can

easily imagine a man lost in this utter stillness and swoon of Nature finding the horror and oppression unendurable.

Section IV.—From the Snæfell to Djúpivogr.

To Gísli's infinite satisfaction, a vile sea-fog crept up the Jökulsá valley, slowly, but persistently, and, meeting scant opposition in the air, which the falling aneroid showed to be unusually deficient in weight, it spread, like the magical "Foka" of folk-lore, over the face of the upper world. Below us, we afterwards heard, all was merry as a fine May-day. I had intended to make the Kverk direct from "Snowdon," and from that vantage-ground to prospect the Kistufell and the Skjaldbreið, with "Trölladyngja," the bower of the Troll-Carline. But in the words of Wordsworth's happy warrior, I did not see what I foresaw, and had only the cold comfort of reflecting—

"Est quiddam prodire tenus, si non datur ultra."

Icelandic exploration is "chancy" as Central African, and the traveller must expect to be the sport of circumstances far beyond his control, unless, at least, he can afford unlimited time.

The next morning (August 20) was also foggy: I waited till 8.45 A.M., and then all the *munitions de bouche* being thoroughly exhausted, the word was given for a retreat. The approach to Valthiófstaðir was perfumed, after the rancid moss and the hard snow-wind, by the fragrant crop of newly-mown hay. I bade friendly adieu to the family which had shown me so much kindness; to Stefán, who was still abed, and to Björn, the eldest son. A man of forty-six, and suffering from rheumatism, for which the parsonage is famous, he was the only Icelander who in physique realised my idea of a Saga-hero. The gentlemanly old-fashion parson put into my hands, when parting, an appeal which touched me, "Opto ubi de Islandiâ locutus estis, benè rem referere."

My return-ride need not be described: it was over the same path, the only difference being the last half of the last day,

which is noticed in Chapter XIII. At Hallormstaðir I again missed Síra Sigurðr, who appears not to be of a very domestic turn. Reaching the Berufjörð parsonage at 4.45 P.M. on August 21, I found the ponies far too much fagged by a day's work of 5500 feet, up and down, for riding another twelve miles round the firth. The Reverend was absent from the Prestagarð, but his wife kindly found me a boat and a boat-boy, the student Thorsteinn taking the other oar. Progress was painfully slow, and the tall ghostly loom of Búlandstindr seemed to follow us like a "Fylgja," or fetch. We enjoyed all the pleasures of *l'humidité spéciale de l'eau de mer pulverisée;* the bright phosphoric lights of the tropical seas were absent—indeed, I never saw them in Iceland. At this season the nights become real nights; the smooths in the water, alternating with ripple-lines, had no worse effect than to persuade the inexperienced lads that they were approaching land, and, as the skerries and drongs are thickly ranged along the southern shore, we were fortunate that there was no gale—

> "Only the sea-fogs to and fro
> Skipped like the ghosts of the streams below."

After six hours of mortal weariness, I landed with feet dead from sitting in cold water, and awoke Captain Tvede. My good friend turned out of his bunk; the cooper put the kettle on; sundry glasses of red-hot toddy were administered medicinally; and I went to my old quarters, well satisfied with having ridden, from under the very shadow of the Vatnajökull, in two days to the eastern coast.

The "balance" of my stay at Djúpivogr would not have been pleasant without the Ancient Mariner, who energetically assisted in preparing my diary and in paying off the guides, a matter of $49. Hospitable Hr Weÿvadt's son, the acting Syslumaðr, presently joined us from Eskifjörð, and lectured me upon taxation in Iceland which, as the reader has seen, is "no joke." The only drawback was a certain nervousness touching the movements of the "Diana," which was to touch at Deep Bay for the last time this season. Alternate fog and rain, with faint attempts at clearing about mid-day, had lasted for a week,

and on August 24 the "Postdampskibet" was due. The sea-mist rolled thick as a bolster up the narrow line of Fjörð; I had almost abandoned hope, when suddenly we received the glad tidings of her being anchored at the mouth of the voe. Hurried adieux were exchanged, and we steamed for Reykjavik the same evening.

Rain and fog accompanied us the whole way; fortunately for me, Dr Hjaltalín was on board, returning from a visit to Denmark, or the lively "Diana" would have been a very purgatory of dullness. The rest of my tale is soon told. We made Reykjavik on the 26th. On September 1, I embarked on board an old friend, the "Jón Sigurðsson;" and steaming southwards cast a farewell view, while Iceland faded into the past, at the pale-gold and glittering silver of the Öræfajökull.

On September 15, I landed at Granton.

Conclusion.

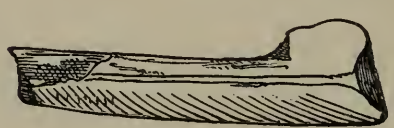
The past has been very short-lived of late, says the Duc de Noailles: the world moves fast, and even

> "the naked, melancholy isles
> Of farthest Thule"

have felt the civilising influence of the nineteenth century. During the two short years which have followed my visit, Iceland, after a generation-long struggle for political liberty and self-government, has conquered, by inscribing her name on the European list of constitutional countries. The "Annus Jubilæus Millesimus" has been an "Annus Mirabilis:" the Present has met the Past: the "living antiquarian museum" has been honoured with a royal visit, which highly gratified the loyal, and which gave the disloyal an opportunity of declaring that "Iceland has laws." The Millenary festival drew a host of tourists and "Own Correspondents," even Hungary being represented, and a dozen octavos will presently be the result. The practical Americans brought with them a gift of some 2000 volumes

which will, when room is found for housing them, change the face of the Reykjavik library. As regards physical matters, Iceland has witnessed a new eruption of the Skaptár; and, as the map shows, the north-eastern side of the island is at this moment (July 1875) in violent volcanic action. The Kötlu-gjá, or Katla's Rift of many terrors, has been visited and found to be another "humbug;" and, last but not least, the Vatna-, or more probably the Klofa-, jökull has been penetrated by the enterprising Mr Watts and his party, who are reported to have planted the Union Jack upon the highest peak. I may conclude with the lines of the Millennial Memorial:

> "Ages thou numberest ten, unconquered and long-biding Thule!
> Hardy mother of men, Thorr grant thee life through the ages;
> After thy sad, sad past, may Happiness smile on thy future,
> And Liberty, won so late, crown every blessing with glory."



STONE AXE IN MUSEUM, REYKJAVIK.

APPENDIX.

SULPHUR IN ICELAND.

SECTION I.

Let us begin this subject with an extract from Hr O. Henchel's Report on the Icelandic Sulphur Mines, and on the Refining of the Sulphur. January 30, 1776. (Translated from the Danish).

I arrived at Krísuvík the 24th of June 1775, and immediately after my arrival I made preparations for examining the mountain of Krísuvík, with its mines and the surrounding neighbourhood. This mountain is situated two miles from the sea, the intervening space all the way from the sulphur mines being a tolerably level field, with only a few diminutive hills. The mountain stretches from north-east to south-west, and about two miles south-west from the mines it terminates in a plain, three miles of which are covered with lava. To north-east I did not examine the mountain more than three miles from the mines, because I found that in this direction the whole of it consisted of the same stuff, viz., of a very loose sandstone (Palagonite), except where the mines and the hot springs are to be found; there it consists of gypsum, and partly also of a red and blue "bolus," which, in my opinion, has been sublimated by acid vapours, and partly thrown up by the hot springs. In some places these soft earths have become a hard stone, the cause, being, no doubt, that the access of the water has been stopped in these places, and when the acid vapours could not any more penetrate through this soft earth, it became hard by degrees.

In some places the above-mentioned gypsum is found to be tough and sticky, and when it is dried slowly it has a greasy touch;

sometimes it is perfectly white, sometimes with red streaks, and one might take it for pipe-clay. One may therefore conclude, that by the acid, the effects of the rain and the sun and the rising heat, a fermentation has been brought about in this earth, and that it has thus become tough. Besides the already-mentioned variation, another kind of gypsum earth is found on the top of the mountain in hard sheets irregularly formed; here we probably see the effects of strong heat combined with absence of sufficient water, after the fermentation has taken place. In other places where this earth is saturated with sufficient acid, and partly dissolved by the same, and has, besides, a suitable or a natural degree of heat, so to speak, it is found in loose, reddish, and prismatic crystals. There is a considerable quantity of it, but it is never found deeper than from one foot to a foot and a half; the deeper you go the less solid it becomes, and at a depth of one foot it becomes quite fluid, because the heat is so strong, and the ground penetrated by warm vapours to such a degree that it cannot attain any solidity; in fire it loses its red colour. In short, this earth goes through so many changes, partly through the greater or lesser degree of heat, partly through a greater or less abundance of acids and water, and through the admixture of foreign substances, that it can almost bewilder one.

The blue "bolus" is found everywhere beside the boiling springs, and some of them are filled with it in such quantities that they are like a pot full of thick gruel. When the "bolus" has become hard it cannot be melted by the blow-pipe, but, in its natural condition, it attracts vapours from the air, and forms very fine white crystals, and at a distance they look like hoar-frost. This seems to show that this kind of stone must be impregnated with calcareous earth which has been saturated with vitriolic acid. That it must be this kind of earth in a hardened state is seen both from its form and from the flowers of pyrites that are mixed with it; for when one breaks off a piece of these earths in their soft and half-solid condition, the broken pieces have the same form, and are also interspersed with pyrites.

The red "bolus" is always found on the surface of the ground like the white gypseous earth, and is never covered by a bed of

another kind; it is never mixed with the water of the boiling springs; there is no sublimated sulphur where it is found, although the subterranean heat in some such places is quite as strong as where that process actually takes place.

Several hot springs are to be found here, and most of them contain the blue "bolus," but one contains white earth. These springs often disappear in one place, and break out again in another place where no spring has been before; the probable cause is that the narrow pipes under the ground, through which the spring is supplied with water, fill up by degrees; the strong heat transforms the water into very elastic vapours, which break through the ground where they find the least resistance, and thus a new hot spring is formed.

On a hill between the southernmost hot spring, called the Bath-room, and the more northerly springs, a hardened "bolus" is found; it is so brittle that it can easily be broken between the fingers; it is porous, and its holes are filled with hardened lime. At first I assumed this "bolus" to be a kind of lava partly dissolved by the atmosphere and the slow heat rising from the ground; the lime I took for a kind of salt, which had been embedded in the lava, and let loose by its solution, and then settled down into the holes of the "bolus." But, upon closer examination of the solid state of this lime, and, after having tested it by aquafortis, by which it was brought to a high state of effervescence, I saw plainly it must be lime. I had tried to dissolve it in water, but without success; if it had been a salt let loose by the dissolution of the molten lava, it must have been more loose and in a somewhat crystallised state. My idea is that the lime must have been sublimated by the hot vapours when the lava was already thrown out; then it subsided into the holes of the lava and became hard. When I compared this earth with the lava of other places where volcanoes had been, from which the lava had spread far and wide, without undergoing any perceptible change or dissolution, I saw that this could never have been a lava. Although the lava of volcanic mountains is often confounded with slag produced by burning of the ground, I saw that this had never been melted to real slag; and it seemed to me therefore probable, that it must

be a kind of hardened clay. I did not, however, find anything to confirm my conjecture until I came to Mývatn, where I found specimens of it in a soft and crude state.

The loose sandstone (Palagonite) already mentioned, which is found besides the most northern hot springs, is there much finer than in other places; it is of a slaty structure, and between the plates gypsum is found, so one might almost take it for alum plates. On the top of the mountain another kind of sandstone (trachyte ?) is found; it is a good deal harder and burnt; it looks like millstone rocks from the Rhine, yet it is more porous; it is in irregular heaps, and never makes a whole mountain, as if it had been thrown over by earthquakes.

Near the boiling springs, where the ground is loose and porous, but especially where the heat has free ventilation through the above-mentioned gypseous earth, the sulphur is to be found. At the bottom it is dissolved and mixed with acid vapours; and when the sublimation has taken place, it becomes fixed in the outermost crust where there is a colder bed; and here it is found either in the shape of crystals, powder, or flowers; it is never deeper than one, two, or three inches under the surface, according to the greater or lesser degree of heat, or the greater or lesser porosity of the earth which forms the uppermost bed, as the sulphur bed itself, when it is in the shape of powder, is never more than three to six inches; and when in a crystallised form, never thicker than two to two and a half-inch, and three inches at the very highest.

These mines are not many, and do not cover a large space of ground; there are indeed a few spots here and there where sulphur is sublimated, but these spots are very small. The most important as well as the largest are the two mines highest up in the mountain; one of them is 120 yards long, and from 16 to 20 yards broad; the other is from 140 to 160 yards long, and from 20 to 40 yards broad. In these two mines the finest and best sulphur is found in the largest quantities. The bed covering the sulphur contains a great deal more of acids than the layer immediately below it, because the hot acid vapours rising from the depths below must keep the lower bed permanently acid and damp; the surplus acids are driven up through the

sulphur, and that portion of them which does not unite with the sulphur, comes to the uppermost crust, where it is dried by the combined efforts of the sun, the air, and the wind. Here the acids are therefore more concentrated, and consequently able to dissolve some portions of the gypseous earth with which it has become united; in this condition it makes a kind of flowers of alum, which, however, are partly vitriolic or blended with iron. I tried to examine the purity of this salt by dissolving it in water. When the water had been filtered it had a green colour; thereupon precipitated with alkali, it gave a white precipitate; and when this was separated from the water, the latter became after a while quite yellow, as if it had been coloured with iron rust. This salt cannot really be called alum unless we should call it *lime-alum*. Like alum it has a nauseous taste, but more pungent and almost caustic. When, after dissolution, it has become solid by evaporation, it is not nearly as close as alum, and no crystallisation can be perceived in it.

As the sulphur is sublimated in the manner above stated, and by condensation becomes fixed in the cold earth at the surface, it will be seen that the opinion is erroneous, that sulphur is generated in earth penetrated and made porous by the air. My instructions were to find out, by blasting the rocks, whether any traces of sulphur were to be found in them; but blasting was out of the question on account of the softness of the ground, the great heat, and the large quantity of hot vapours. The rocks must, moreover, be at a great depth, since all attempts to find them with the earth-borer, which was fifteen feet in length, proved unsuccessful.

Close to the mines on the south side heat is seen to have been in the mountain formerly. Here the same kinds of stone are found as at the hot spring, and the yellowish gypseous earth as well. By some cause or another the heat has been removed somewhere else. I was convinced that sulphur must be found here, as it might have been covered with earth after the heat left; but all my diggings, both with the earth-borer and otherwise, proved unsuccessful.

With the earth-borer I tried to ascertain the difference of the beds where sulphur is sublimated, and of those where it is not,

and where only a slight heat is felt. The first experiment was made in the northernmost mine. Below the sulphur I found a one-foot thick bed of the white gypseous earth; then there was a bed of fine blue "bolus," or an earth impregnated with flowers of pyrites here and there. In this bed the heat began to increase, and when I came to a depth of three feet the bed became a little harder, but, at the same time, warmer and coarser, as if it were mixed with gravel; and thus it continued to the depth of fourteen feet, when it became a little softer.

I examined another place where no considerable heat was felt. The white gypseous earth continued to the depth of a foot and a half; and in this place it was harder and more solid than where the heat had a free egress. Then came the blue earth; uppermost it was somewhat loose, but farther down it became so hard and close that the earth-borer could hardly penetrate it; the lower down the more it became mixed with pyrites, and was filled with gravel, as it were. At the depth of twelve to thirteen feet it became a little looser as I thought. It was the same kind of earth all the way through; the heat was intense.

The third place which I examined was at the most northern point, beside a small hot spring, thick with blue earth. Uppermost there was red "bolus" to the depth of one foot; then a bed of purple and a yellowish one, three feet thick; then a purple and bluish one, one foot thick. The heat increased with the depth; here the bed became very hard, and I found the blue earth impregnated with pyrites. This bed was ten feet deep; at this depth the heat was so intense that the water trickling down from the upper beds boiled violently, and prevented all further progress.

By these experiments I found that the conditions necessary for the sublimation of the sulphur are: *Firstly*, A sufficient quantity of water to keep the soil loose and porous, that the sulphur may pass through it, and to drive the sulphur vapours upwards. *Secondly*, That the water must come from below; for when it comes from above, it cannot penetrate through the blue bed in the absence of the rising hot vapours which keep the bed porous; and in that case the bed becomes harder and harder, and prevents the sublimation of the sulphur.

I tried in several places, both with the earth-borer and other-

wise, to discover some of the so-called dead mines, but without success. From the many experiments I made, I concluded that the volcanic mountains of Iceland must have been sulphur mountains or sulphur mines in the beginning; the blue bed became hard, and the sulphur vapours were thus prevented from being sublimated. Thus they became more condensed, and, at the same time, more elastic in the ground; then there arose in them a "heat-forming movement," by which the whole ground, which is very sulphureous, became violently shaken, and subsequently ignited, causing tremendous destruction.

Mývatn.

Fremri-námar.

At Húsavík I obtained horses and workmen from the sheriff, and left that place the 9th of August, and arrived the 12th in the evening at the so-called Fremri-námar. At a distance of about one mile from the mines, there is a valley called Hellaksdalur, where there is a little grass, just so much as to give the ground a green colour, and this is the only green spot that is to be found here within a distance of many miles; yet there was not grass sufficient for the horses, but I had to bring with me hay for them, and water for the men. In this valley I spent the night, and the next morning, the 13th, I went to the mines, which are about ten Icelandic miles (11 indirect, 40 geographical) south-east from Húsavík, situated on the west side of a mountain called Herðubreið. On the top of the mountain there is a ridge or an eminence, from which there is an extensive view; but as far as the eye can reach in every direction, nothing can be seen but lava. This eminence is 1500 paces long, and equally broad, and about 120 feet high. On the top of the eminence there is a deep hollow completely round, and about 200 paces in diameter. From its shape it is called by the inhabitants a *kettle*. The south and west sides of this eminence, as well as the hollow itself, consist of lava, and it may therefore be concluded that the mountain has been an active volcano in olden times. On the north and east side the mines are found, and where these are the mountain consists of gypseous earth like that at Krísuvík.

A large quantity of sulphur is said to have been dug from the dead mines here; but now they are rarely found, because they have been worked annually, and the sulphur is not generated afresh in these as in the live ones. Thirty paces from the end of the valley, and also on the side of the mountain, the first live mines are found. In the valley they are about 60 paces long, and from 20 to 30 broad. On the side of the mountain they are 200 paces long, and from 20 to 30 broad. On the east side of the mountain, 40 paces lower than the mines above mentioned, other live mines are found 220 paces long, and 40 to 50 paces broad. From all these the sulphur has been completely cleared away, because the sulphur found here was very good and pure. The soil is moderately damp, and the sulphur has just as much water as (when converted into steam by the heat) is sufficient to raise it up, and to keep the ground in a loose and porous condition, so the sulphur can be sublimated through it without hindrance. Yet it does not make the soil too loose; in that case, small particles of earth would rise along with the sulphur, become mixed with it, and thus make it impure. In the mines, which, according to my guide's information, had been completely cleared of sulphur, there was already a new bed of sulphur one to two inches in thickness, but very impure. There are others which formerly yielded sulphur, now quite cold and ruined. The destruction of the mines, as well as the impurity of the sulphur, arises from careless digging. When the peasants dig the sulphur out of a mine, and particles of earth and impurities are sticking to it, they clear away the largest lumps; but they do not take care not to let the impurities fall down where they had taken the sulphur, where some flowers of sulphur always remain. For although the uppermost sulphur is tolerably compact and crystallised, the lowest is loose. The reason is that the uppermost bed is made more and more compact by the sulphur rising from below, and the acid phlegm surrounding the sulphur vapours cannot evaporate; the small sulphur particles are thus prevented from immediate contact with each other, but are enveloped in the superfluous phlegm. This is the reason why the lowermost sulphur must remain in the shape of flowers until the hard crust is removed; then the phlegm is exposed to

the air and evaporates, until the surface has become hard again. It will therefore be seen, that when the impurities fall into these loose flowers, and the fine sulphur is subsequently sublimated among them, the impurities will be imbedded in the sulphur, and must be taken out with it at a second digging.

Another reason for the impurity of the sulphur is this, that a man, coming to a mine to see how the sulphur is, thrusts his spade into the ground in various places, without first carefully removing the upper earth, whereby the sulphur and the earth become mixed together. If he does not think the sulphur good or abundant enough to be dug out at that time, he leaves the mine thus disturbed; and the rising sulphur is sublimated among the disturbed lumps of earth and sulphur, and the whole becomes a compact mass; it often looks quite pure, but turns out altogether different at the refinery. Thus a single man may in one hour destroy a great many mines that might have been excellent if more carefully handled.

One more cause of the impurity of the sulphur may be found, I think, in the following circumstance. When the peasants come to a good mine they take out all the sulphur that is to be found there, and do not take care how they tread down the loose earth below the sulphur; the down-trodden earth, over which the wind sweeps freely, becomes tough and hard when the heat from below is not strong enough to break through it, and thus keep it porous; thus the mine becomes cold and useless. In other places where the heat is strong enough to force the steam through the trodden earth, there is, however, this disadvantage: *Firstly*, It takes a longer time for the sulphur to arrive at a state of perfect sublimation than if the earth had remained in its porous condition. *Secondly*, The fresh sublimation will be impure. When one steps into the loose earth, deep holes, separated by thin ridges, will be formed. When the sulphur is formed in these holes, covering the ridges as well, it is evident that all these ridges must come out with the sulphur at a subsequent digging.

Those that work the mines must therefore be ordered: *Firstly*, To remove the earth before they dig up any mine, so that nothing shall fall into the sulphur. *Secondly*, When they remove lumps of earth from the sulphur, they must carry them outside the

mine. *Thirdly*, When they work a mine, they must first remove the uppermost earth; they must not completely empty any mine of its sulphur: they should leave the utmost border standing; then run a trench along the whole length of the mine, then leave a ridge standing, and run another trench, and so on until they have reached the utmost border, which they are to leave standing. Thus the wind will be prevented from having a full sweep of the mine, and thus making it cold. These trenches ought therefore to run across the course of the most frequent winds; these are here, in my opinion, a north-wester and south-easter. After one year the ridges left standing might be taken with the same precaution as mentioned above. The workmen ought therefore to be as much as possible prohibited from stepping into the mines; every digger should take with him a board to stand on while he digs, and this he should move with him as he proceeds. By these means the mines might be saved from being unequally trodden down, and the digger might escape from burning his feet, which he now frequently does, by sinking through the loose and hot soil.

On the east side of the mountain, below the above-mentioned mines, a red "bolus" begins, stretching round the mountain from south to north until it meets with a sandstone mountain; between the mountain and this ridge of "bolus" there is a little sulphur mine, and here the gypseous earth is found below the sulphur as usual. Digging up the real "bolus," I found it to be very loose and soft; it was full of holes, like the hardened one at Krísuvík, and the holes were filled with lime, very loose and gelatinous, and slimy to the touch. Under the "bolus" the earth was in many places hollow, and one hardly dared to tread there. Very hot vapours arise from the bottom, by which these earths are sublimated, for it is quite as hot here as in the sulphur mines. This is a very interesting circumstance, and well worth observing, that there are two places lying side by side, and presenting such a difference in the stuffs driven up from the bottom by the heat, which is equally great in both places. In one, however, sulphur is sublimated along with a strong acid, and in the other the above said lime is sublimated, and not the least acid is found in it.

Hliðar-námar.

The 15th I went to the so-called Hliðar-námar, which are about eighteen miles distant from the former ones. These are the largest of all the mines, and here too is the greatest heat; the sulphur is consequently sublimated in less time than in any of the others. At present there is a large quantity of sulphur here, but it is all in powder, or in the form of flowers; most of them are found in the mountains, as in the former places; and the sulphur bed is in many places six inches and more in thickness. The reason why the heat drives up greater quantities of sulphur here than in the former places is to be found in the looseness of the soil; it is not only much looser than in the former ones, but in some places even too loose and damp, which both makes the spot difficult to approach in order to dig, and fills the sulphur with earth and impurities, so as to make it useless. The reason why these mines are in such a good condition now is, that the sulphur brought from here to the refinery was not so well received as that which came from the Fremri-námar, or the so-called Theystarreykja-námar nearest to Húsavík. I admit that the sulphur found here is more mixed with earth and acids than in the other places; not, however, in such a degree as to offer any scrious difficulties. But as the whole of the sulphur is in the form of flowers, and the earth immediately below it has nearly the same appearance, and cannot therefore be easily distinguished from the sulphur, the peasants do not, therefore, I think, separate the sulphur from the earth with as much care as where it is found in a more solid condition, and where the earth is more easily detected.

The mountain where these mines are situated stretches from north to south, and on the north side it goes a considerable distance beyond the mines. The same kinds of earth are found here as at Krísuvík, except the grey slate, of which there is none here, neither are there any variations in the gypseous earth; and very little of gypsum is to be found, which probably is owing to the higher degree of heat, or it may be because the heat has less interrupted egress, and consequently keeps the earth constantly porous. There is a larger quantity of the vitriolic alum. For

the rest, the mountain consists of common sandstone. That even these mines have not been worked carefully is evident from the considerable number of ruined and cold mines.

Below the sulphur mountain on the east side there are three boiling springs; it is evident that the two farthest to the south, and situated close to each other, have been produced by an earthquake, because they are found in a rift in the mountain, and boil with such awful noise, especially the most southern one, that it can be heard 200 yards off, and the ground, which consists of bluish "bolus," is shaken. Close to these hot springs is a large lava-tract, which spreads to the north to a considerable distance; it also winds round the southern point of the mountain, and crosses the path that leads to Fremri-námar, and spreads almost down to Reykjahlið. The ground is hot everywhere, and the hot vapours rise through the lava, and the whole is therefore continually steaming. About nine miles north of these mines is the mountain Krabla, where excellent mines are said to have been, but when the eruption of 1724 took place, it caused great destruction. One branch of the lava-stream coming from this mountain passed close by the mines on the west side and through the farm of Reykjahlið, the whole of which was destroyed, and at last the current flowed into the lake Mývatn. The lava thus produced was in various places hollow, as if the uppermost crust had been hardened by the air, and the still liquid lava which was under it flowed away. As the outmost crust cooled down by degrees, it contracted, and thus rifts were formed; in some places also it was not strong enough to support its own weight, and fell down. Crawling into these caves, I found a kind of salt which had been sublimated from the earth, and become fixed there. It had a bitter taste, and after being dissolved and dried again it formed square crystals, with a square point. It was easily melted by the blow-pipe.

Theystarreykja Mines.

The 31st of August I came to the Theystarreykja mines, which are about two miles from the refinery. A large quantity of sulphur is said to have been brought from these mines to the refinery, as they were very important ones, but now they are

almost all cold, and it is only in a few of them that sufficient heat is found. Therefore, although four years are said to have passed since sulphur was taken herefrom, there are only four or five where it might be taken again. Nevertheless the heat seems in some of the cold mines to be breaking through so far that the vitriolic acid can be sublimated through the ground, as it has in combination with the dissolved lime formed the above-mentioned vitriolic salt. It is therefore to be hoped that many of these ruined mines may recover after a time, yet this is not certain. Here is again a clear instance of how the very best mines may be ruined in a short time by careless treatment. If, therefore, the still remaining mines, either here or in other places, are to be preserved, the peasants must be prevented from digging the sulphur.

The home-field of Theystarreykir is good though small, and has a fine situation; and to the north there is a large piece of uncultivated ground which might be made useful. Close to the farm is a hill called Bæarfell, where some of the mines are situated. It begins on the south side of the most southern mines, and continues in a northerly direction, then it takes a turn to the east and then again to the north. In the corner between the eastern and southern arms of the Bæarfell the best mines are found at present. There have been a great number of mines on the west side of the mountain, but these are now cold, except a few in the middle, where the earth is tolerably loose, and the heat can therefore sublimate the sulphur. Those, however, that are on the east side of the hill are quite cold, except two small ones high up in the hill, but there is sufficient heat in all these mines; and I am therefore of opinion that sulphur may be sublimated in them for the future. Some of the western ones are also found to be considerably hot, and it may therefore be expected that these ruined mines may recover in time. On the west side of these mines there is a large tract of lava. On the north side of the Bæarfell the home-field begins, and north of that again a piece of uncultivated ground; when beyond that, the lava reappears and takes an easterly turn. On the top of the Bæarfell there is a great deal of red "bolus," and a strong heat under it. But sulphur is never sublimated with or through

the red "bolus," therefore it is not found here. Very little of gypsum is found in these mines. The warm springs are neither deep nor very hot, and the minerals are either sandstone, or hardened like those at Krísuvík.

All the sulphur mines which I visited in the north are in the following condition: *Fremri-námar* bad, because all the sulphur was taken away last year. *Hliðar-námar* good, because they have been saved the most. *Theystarreykja-námar* are worst, because the largest quantity has been taken from them. My advice is, therefore, to let *Fremri-námar* and *Theystarreykja-námar* rest for some time, and to work the *Hliðar-námar* only. When these have been emptied, the former two may be worked in their turn.

The Refining of the Sulphur.

The refinery is situated a few hundred paces from the factory of Húsavík, and consists of a sulphur hut; two store-houses, one for the raw sulphur, the other for the melted, or refined ore; a dwelling-house, with kitchen and outhouses, all built of turf according to the Icelandic fashion. The hut is about 20 feet long and 12 to 14 feet broad. In the middle of it is a small chimney, and on both sides of it two iron boilers are walled in; one is quite small, and holds only 1 cwt. of melted sulphur, the other holds 3 cwts.; the smaller one is very little used. Above the boiler a small board is inserted in the chimney, which reaches over the middle of the boiler; it has a hole at one end, through which a stick is put to stir up the sulphur; when its lowermost end reaches the bottom of the boiler, the uppermost is supported by the board, and he who stirs the sulphur can therefore move the stick more easily than if its upper end were loose. The other instruments are, an iron spade with holes, which is used for taking off the impurities floating on the molten sulphur. Then there are some wooden forms, into which the molten sulphur is poured. They are made of oak planks 3 inches thick, 12 inches broad, and 3 feet long. On one side of the two outermost planks, and on both sides of the two middle ones, three cylinder-shaped grooves are made, so that every half-cylinder groove of the two outermost corresponds with those on the middle ones,

and those on the middle ones with each other. The planks are laid one on the top of the other, and kept together with an iron ring; in such a form nine bars can be made at the same time. A small iron sieve with narrow holes is put in the top of each hole, through which the sulphur is sifted when poured out from the boiler with a large iron ladle. When not used the forms are put into a tank filled with water, in order that the hot sulphur may not stick to the sides of the holes. This is completely prevented by soaking the forms in water. These are all the instruments used in the refining of the sulphur. The fuel used is some little wood sent by the Government, and for the rest peat, of which there is a good supply close by.

When the sulphur is to be purified, a slow fire is made under the boiler, and when it grows hot a small quantity, about two pounds, of raw sulphur is put in; this is stirred till it becomes hot; the fire must be slow, in order not to burn the sulphur, which might easily happen on account of the quantity of earth mixed with it. When the portion is quite dry and begins to melt, a little train-oil is poured in and stirred quickly, by which the earth unites with the oil, and floats on the top. As soon as this is melted, another portion of raw sulphur is put in; and when this is melted, another portion of oil, if required: this is easily seen; if the earth absorbed by the oil falls to pieces like ashes, it falls again into the sulphur, and oil must be poured in immediately. Thus the work is continued until the boiler is full. When the boiler is nearly filled with molten sulphur, a quantity of train-oil is poured on the top of it, and heated sufficiently. Then the fire is removed and the stirring discontinued. The impurities absorbed by the oil are removed with the iron spade described above. The forms are taken out of the water, put together, and raised on one end. The iron sieve described above is placed over the first form, and the sulphur poured over it from the boiler. When it is full the sieve is placed over the second one, then over the third, and so on.

SECTION II.

The next account that we have of the Krísuvík diggings will be found in the following extracts from "Travels in the Island of Iceland during the Summer of the Year 1810," by Sir George Steuart Mackenzie, Bart., etc., etc., second edition, 1812.

Pp. 113, 114.—We set out towards the Sulphur Mountain, which is about three miles distant from Krisuvik. At the foot of the mountain was a small bank, composed chiefly of white clay and some sulphur, from all parts of which steam issued. Ascending it, we got upon a ridge immediately above a deep hollow, from which a profusion of vapour arose, and heard a confused noise of boiling and splashing, joined to the roar of steam escaping from narrow crevices in the rock. This hollow, together with the whole side of the mountain opposite, as far up as we could see, was covered with sulphur and clay, chiefly of a white or yellowish colour. Walking over this soft and steaming surface we found to be very hazardous, and we were frequently very uneasy when the vapour concealed us from each other. The day, however, being dry and warm, the surface was not so slippery as to occasion much risk of our falling. The chance of the crust of sulphur breaking, or the clay sinking with us, was great; and we were several times in danger of being much scalded. Mr Bright ran at one time a great hazard, and suffered considerable pain from accidentally plunging one of his legs into the hot clay. From whatever spot the sulphur is removed, steam instantly escapes; and, in many places, the sulphur was so hot that we could scarcely handle it. From the smell we perceived that the steam was mixed with a small quantity of sulphuretted hydrogen gas. When the thermometer was sunk a few inches into the clay it rose generally to within a few degrees of the boiling point. . . .

Pp. 115, 116.—At the foot of the hill, in a hollow formed by a bank of clay and sulphur, steam rushed with great force and noise from among the loose fragments of rock.

Farther up the mountain we met with a spring of cold water, a circumstance little expected in a place like this. As-

cending still higher, we came to a ridge composed entirely of sulphur and clay, joining two summits of the mountain. Here we found a much greater quantity of sulphur than on any other part of the surface we had gone over. It formed a smooth crust from a quarter of an inch to several inches in thickness. The crust was beautifully crystallised, and immediately beneath it we found a quantity of loose granular sulphur, which appeared to be collecting and crystallising as it was sublimed along with the steam. Sometimes we met with clay of different colours, white, red, and blue, under the crust; but we could not examine this place to any depth, as the moment the crust was removed steam came forth, and proved extremely annoying. We found several pieces of wood, which were probably the remains of planks that had been formerly used in collecting the sulphur, small crystals of which partially covered them. There appears to be a constant sublimation of this substance; and were artificial chambers constructed for the reception and condensation of the vapours, much of it might probably be collected. As it is, there is a large quantity on the surface; and, by searching, there is little doubt that great stores may be found. The inconvenience proceeding from the steam issuing on every side, and from the heat, is certainly considerable; but, by proper precautions, neither would be felt so much as to render the collection of the sulphur a matter of any great difficulty. The chief obstacle to working these mines is their distance from a port whence the produce could be shipped. But there are so many horses in the country, whose original price is trifling, and whose maintenance during the summer costs nothing, that the conveyance of sulphur to Reikiavik presents no difficulties which might not probably be surmounted.

Below the ridge on the farther side of this great bed of sulphur we saw a great deal of vapour escaping with much noise.

SECTION III.

Mr Consul Crowe's Report (1871-72) supplies the following notices of mineral prospects in Iceland:

Mineral deposits, showing the presence of copper, iron, lead, and silver, are found in many parts of the island, but either from their poorness or the want of fuel, no attempt has been made to utilise them. Calcareous stone, marbles (?), and feldspath are also found; and large deposits of sulphur likewise exist in some districts, which at different times have been the object of commercial speculation. The sulphur mines at Krisuvik, in the south, are at present worked for foreign account, but, I believe, owing to their partial inaccessibility, and difficulty of transport, without much success.

The right of working sulphur mines at Myvatn, in the northern portion of the island, has recently been conceded by the Danish Government to an Englishman on a fifty years' lease. They were worked some years ago for account of a Copenhagen house, but were abandoned in 1851, since which time they have remained closed. Many causes contributed to this result; the chief of which, doubtless, were, ignorance of the proper method of mining the sulphur, the cost of transport on horseback to the sea-board, and the want of remunerative demand.

Since then these conditions have changed, and there exists no reason why these mines should not be worked profitably. They extend over a large tract of country, and their position is most advantageous, in the midst of a flat country, within an easy distance of Husavik, a convenient shipping port; and, during the many years they have been closed, the deposits must have very greatly accumulated, and should yield abundantly. Indeed, so strong was this conviction in the minds of the natives that they long opposed the leasing except on very onerous terms, although quite unable themselves to work them.

As these mines are now likely to remain in English hands for many years, a short account of their former history may be read with some interest.

They are situated between 65° 20′ north latitude and the Arctic Sea, or more definitely speaking, lying in the tract between Myvatn on the east, and Jökulsá (glacier river) on the west.

The right of working them was bought from private owners by the Danish king, Frederick the Second, in 1563, and this

right has ever since been in the possession of the Danish Crown (now the State). During the reign of this king a considerable quantity of sulphur was extracted, amounting to as much as 400 tons annually. In the reign of his son and successor, Christian the Fourth, the produce appears to have fallen off, and his Majesty was unsuccessful in his endeavours to lease them to foreigners. To the falling-off of their supply of sulphur in this reign, and the consequent scarcity of gunpowder, the Danes attribute their defeat by the Swedes in Holstein (1644).

In 1665 we are informed that the Crown granted a concession for "digging sulphur" to a foreigner, who is stated to have exported large quantities up to the year 1676; since which date no special mention appears to have been made of them until the early part of the eighteenth century, when two foreigners, apparently Germans, acquired in 1724 the right of exporting sulphur from Iceland. They also shipped considerable quantities during the succeeding five years, when the death of the lessees put a stop to this commerce.

After this date, and up to the beginning of the present century, the Danish Government worked the mines for their own account, at times, it appears, with considerable profit, until 1806, when they were again leased to a foreigner. Subsequently, they have at times been worked by private speculators up to 1851, since which date, as already mentioned, they have remained untouched.

In 1840 they were visited by some scientific travellers, who calculated that these northern mines might easily yield an annual net profit of £1000 or £1200. Ten years later they were specially examined by a Danish mineralogist, who discredited this statement, and reported them to be less valuable;[1] but in speaking of the Krisuvik mines in the south, he says, "These might be easily made to yield 200 tons annually," and yet they have always been considered inferior to the northern mines. A French geologist, Eugène Robert, who visited Iceland in 1835, and afterwards published a treatise on its geology, calls the

[1] In Chapter XIV. I have given the reasons why the Mý-vatn mines were not recommended by the Danish engineers.—R. F. B.

attention of the Danes to the value of the Myvatn mines, and advises them not to lease them to the Englishmen (who were then applying for them), as the property might become of great consequence in the event of the sulphur mines of Sicily falling off, of which, he affirmed, symptoms had shown themselves.

It will thus be seen that opinions are divided as to the productiveness and present richness of these mines; but so much is certain, that they have for several centuries been worked at intervals with varying results; at times with considerable profit: the history of the country, and the experience of so many years, point to the conclusion that, if properly worked, they would become valuable property.

The mines, for instance, at Reykjahlidar-námar are the richest to be found in all Iceland, and produce large quantities of the purest sulphur.

The reproduction is incessantly going on from upwards of a thousand small eminences, called solfataras, which are found on the ridge along the sides and at the foot of Námarfjall. Rich sulphur deposits are also found at the Ketill Crater (called Fremri-námar), while the least rich are the Krafla-námar, but at all these there is a continual deposition of sulphur going on. They all have the great advantage of lying in the track of one of the few practicable roads in the island, leading to an accessible shipping port.

SECTION IV.

Hôtel de la Ville (Au Troisième), Trieste,
16*th February* 1873.

The following are the notes which I made, for the use of Mr Lock, upon Mr Vincent's able and instructive paper.

"Holding sulphur-export to be the most legitimate trade in which Iceland can engage, I rejoice to see the paper by Mr C. W. Vincent, F.C.E.

"The writer's theory upon the formation of the mineral, by the by, the action of water upon pyrites, is not new, nor am I certain that it is true: perhaps it may be provisionally

accepted, until we have a better. He has done good service to students by noticing the similarity of the Icelandic diggings with those of Central Sicily and of the Yellowstone River sources. On the other hand, after actual inspection of the Icelandic sulphur mines, I must differ upon many details with Mr Vincent, who has derived his information from hearsay. He nowhere notices the interesting combination of the Palagonitic groundwork of the island with lavas of modern date, which seems to me a constant feature of these solfataras. The venerable Sir Henry Holland recorded in 1810, that the Krísuvík formation occupied high ground 'composed principally of the conglomerate or volcanic tufa which has before been noticed:' this palpable reference to Palagonite has not been worked out as it deserved to be. The 'vivid word-pictures' of older travellers are either written in the fine style of former days, or the subjects of description have lost youth and vigour. The 'tremendous proofs of what is going on beneath us' are now, or have become, phenomena on a very mild scale; while the 'thundering noises' which 'stunned the ears' of a former generation, have learned to 'roar gently,' and to avoid shaking weak nerves.

"As regards the authorities quoted, I may notice Commander (now Admiral Sir) J. E. Commerell, who in the Vincent lecture appears enthusiastic upon the capabilities of the Krísuvík mines. But that able officer's more dubious views do not come forth: he expressly states in the same report that 'a tramway might also be laid down; but, as there are two hills to cross, with other difficulties, I could not positively state whether this were possible or not.' Mr Seymour (*fils*) has spent many months in Iceland, but that does not mean Krísuvík. Captain Forbes is also quoted, although it is well known that my friend has not a high opinion of the south-western solfatara, and the sketch of travel over that part of Iceland given in his lively volume (p. 103) suggests anything but facility of transit. When a tramway has to cross a hill-range, and a lava-tract some twelve indirect miles broad, we already expect difficulties. Here, however, I must confess not to have seen the plan and estimates drawn up by Messrs Shields and Gale, who set out for Krísuvík a few days before my departure from Iceland.

"Also Mr Vincent appears to extend the solfatara district of Krísuvík over a space of twenty-five miles, along a fancied volcanic diagonal. This may be the case, but on July 9-10 Mr Chapman and I rode from 'Krísa's Bay' eastward to the Reykir, *alias* the 'Little Geysir,' and, although we looked curiously for the enormous area theoretically assigned to the sulphur formation, we failed to see any sign of it. Our path ran over the normal quaking bogs, over large spills of modern lava poured down the walls of the high interior plateau, and occasionally over a strip of sea-sand. The apparently indispensable Palagonite was also missing till near the end of the second march. Gunnlaugsson's and Olsen's large map of Iceland, hereabouts so minute in all its details, does not show a single hot spring between Krísuvík and Reykir; on the contrary, all is coloured red-yellow, as a Hraun (lava-tract). Even the 'western mine' of Krísuvík has been described to me by authorities who know the country well, as containing very little sulphur; and a passing visit induces me to believe them.

"All these are minor objections to Mr Vincent's paper. But when speaking of, or rather alluding to, your concession, he has fallen into grievous error. If he has studied the subject, he simply misrepresents it; if not, he should have avoided all depreciatory notice of the Mý-vatn mines.

"And now for the proofs.

"I read (p. 137) with unpleasant surprise, 'a violent eruption of the mud-volcano Krabla to a great extent buried the then active strata beneath enormous masses of volcanic mud and ashes, so that the energy has been probably transferred along the line' (viz., the great volcanic diagonal stretching, or supposed to stretch, from Cape Reykjanes to the Mý-vatn lake) 'southwards,' that is to say, to Krísuvík.

"Without dwelling upon the fact that Mr Vincent's theory about the local production of sulphur renders such 'transfer of energy' impossible, I remark that, firstly, the Hlíðarnámar, the nearest deposits of the Mý-vatn sulphur, are at least two miles removed from the extremest influence of Krafla, whilst the Fremrinámar are four times that distance, and the latter are situated upon a much higher plane. To those who have breathed

the live sulphur tainting the air for mile after mile, this 'transfer of energy' becomes a mere matter of fancy. Secondly, on the very flank of Krafla, the hollow called Great Hell (Helvíti Stærra) shows an abundance of sulphur, which extends right across the valley westwards to Leirhnúkr (mud knoll). In this small section of your concession Gunnlaugsson gives no less than seven Hverar (boiling springs) lying close together. I need hardly pursue this part of the subject: to one who has seen the country the assertion that any eruption from Krafla has effected either the Hlíðar or the Fremri diggings appears inconceivable. Suffice it to say that your six square miles of live sulphur contrast wonderfully well with the two at the south-western end of the island. Krafla alone contains as many solfataras, boiling springs, and 'makkalubers' (mud caldrons), as exist in the whole district of Krísuvík, and Krafla is only a part, a very small part also, of the north-eastern deposits.

"Again I see with astonishment (p. 143), that 'the sulphur at Myvatn, though great in quantity, is at too great a distance from the port of embarkation to permit its extraction being carried on with any chance of competing with that from the Krisuvik mines.'

"It is true that your concession lies some twenty-five direct geographical miles from Húsavík, the nearest available port, whilst those of Krísuvík are only ten distant from Hafnafjörð. But a simple statement of this kind is fallacious, because it conveys the wrong impression. It is known to every Icelander that the northern line is one of the best, the southern one of the worst, if not the worst, in the island. The Húsavík road has the immense advantage of an easy and regular incline from 900 feet high to sea-level, and in the depths of a protracted winter your sledges can always carry down the material dug up during the long summer days. There is nothing to prevent your having your tramway, when such expensive article becomes advisable.

"You are at liberty to make any use you please of these short and hurried notes. Pray understand that my object is by no means to disparage the sulphur mines of Krísuvík; on the contrary, I hope soon to see a company formed, and a stout-hearted attempt made to benefit both the island and ourselves. M. Robert's

opinion upon the capability of Iceland generally to supply an article which every year grows in request, and his truly Gallican horror of the trade falling into English hands, are too well known, and have too often been quoted, to justify repetition. But I can truthfully say, that the Mý-vatn concession will be found preferable to that of Krísuvík, and I regret that Mr Vincent has adopted, without personal acquaintance with Iceland, information which seems to come from suspected sources.

"Why do you not render justice to the Mý-vatn mines by a lecture, with the assistance of maps, plans, and other requisites? Mr Vincent, I see, proposes to continue writing upon the highly interesting sulphur supply of Iceland: pray remember that in these wild solitudes I am wholly dependent upon the piety of my friends and the pity of those who remember me.

"Ever yours truly,

"Richard F. Burton, F.R.G.S.

"Alfred G. Lock, Esq."

SECTION V.

Sulphur in Iceland. By C. Carter Blake, Doc. Sci., Hon. For. Sec. Lond. Anth. Soc. London: E. & F. N. Spon, 48 Charing Cross. 1873.

The fact that sulphur, one of the most useful substances known, and, in the words of Mr Crookes, "the mainstay of present industrial chemistry," has been an article of commerce throughout all time, and that a ready market has always existed for it, is familiar to all. Like the famous electrum of the ancients, its origin has been comparatively unknown. We shall briefly consider the conditions under which sulphur is found; its geographical distribution over the face of the globe; the method of its preparation for the market, and the circumstances which may lead capitalists to seek for the productive mineral at a shorter distance from our own shores than the Mediterranean or Mexico.

Sulphur is a simple, inflammable, brittle substance, of which all the forms found native belong to the rhombic or trimetric system, and are more or less modified rhombic pyramids. These crystals could not be formed at temperatures approaching that of boiling water, or be exposed to such a temperature without alteration; crystals of native sulphur must therefore have been formed at ordinary temperatures. Sulphur does not occur anywhere in sufficient quantity to constitute a rock, but is widely disseminated throughout rocks of different ages, either implanted in crystals, in small beds, nests and nodules in a pulverulent condition, as a coating, as in some lavas, or as a cement of decomposed trachyte. Dr Sullivan has said:[1]

"In volcanic regions the deposition of sulphur may result from two causes: 1st, the action of oxygen on damp sulphide of hydrogen gas, or on solutions of the gas; and 2d, the mutual decomposition of sulphide of hydrogen, H_2S, and sulphurous anhydride, S_2O. If the former be in excess, water and sulphur appear to be formed; if the latter be in excess, pentathionic acid, $H_2S_5O_6$, and water are formed; the pentathionic acid is gradually decomposed into sulphur and sulphuric acid, which produce sulphates. In connection with this reaction, it may be observed that several sulphates are associated with the sulphur found in districts where the sulphur is formed from gases escaping through fissures. Old craters having such active fissures called fumaroles, are termed solfaterras."

So important an influence does the price of sulphur exercise upon the cost of production of bleached and printed cotton stuffs, soap, glass, and other valuable manufactures of this country,[2] that it was the express subject of a commercial treaty, and in 1838 the British Government took very decided steps to put an end to a monopoly attempted to be established in it by the Sicilian Government.

That the present supply of sulphur is inadequate to the demand is proved by its high price, by the use of pyrites as a substitute, and by the inquiries recently made by the British Government as to its existence in Mexico. That the already

[1] Jukes and Geikie, Manual of Geology, 3d edition, p. 55.
[2] Liebig's Familiar Letters on Chemistry, p. 152.

large demand for this important substance must increase is quite evident when we consider the purposes to which it is applied.

Gunpowder.—Sulphur enters into the composition of this important article in proportions ranging from 10 to 20 per cent., according to whether the powder is required for war, sporting, or blasting purposes.[1] When we consider the vast quantity required by the gigantic armaments now maintained in every civilised country, as well as by the numerous mining and engineering operations at present in existence throughout the world (in which it is indispensable for blasting), we can form some idea of the immense amount of sulphur annually consumed in the manufacture of gunpowder alone.

Sulphuric Acid.—One of the most important chemical agents required in the arts and manufactures, is used very extensively for making soda-ash for bleaching linen, woollens, etc., straw, etc.,[2] manure making, and for a variety of chemical productions; also for refining metals.[3]

Soda-ash (alkali) is obtained from common salt by means of concentrated sulphuric acid. It is used instead of barilla for soap-making, as a substitute for pot and pearl ashes in glass-making; for cleaning and bleaching; and, in the form of carbonate, for medicinal and domestic purposes. In the year 1862 the enormous quantity of from 100,000 to 120,000 tons of the former, and from 25,000 to 30,000 tons of the latter, was made in Great Britain alone.[4] That quantity is now vastly increased.[5]

Manures.—A great consumption of sulphuric acid has of late years taken place for agricultural purposes,[6] viz., in the preparation of superphosphate of lime, the most active manure for turnips, grass, and cereals.

Oïdium.—Within the last few years it has been discovered

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[1] Ure's Dict., vol. ii., p. 432.
[2] Simmond's Dictionary of Trade Products, p. 367; Muspratt's Chemistry, vol. i., p. 320.
[3] Liebig's Letters, p. 149.
[4] Simmond's Dictionary of Trade Products, p. 351.
[5] See Exports for 1872.
[6] Liebig's Familiar Letters on Chemistry, p. 150.

that the use of flowers of sulphur, containing traces of sulphuric and sulphurous acid, and of carburetted hydrogen, is a protection against the vine disease—*oïdium*. Although no reliable information exists as to the exact quantity used for this purpose, yet it is known to be very considerable.

Flowers of sulphur have recently been strongly recommended as a remedy for the potato disease.[1]

Such are a few of the principal objects to which sulphur is devoted, and for which it is needed; thereby proving most conclusively that THE CONSUMPTION IS ONLY LIMITED BY THE SUPPLY.

Sulphur is found in Corfu, the neighbourhood of Rome, Transylvania, Spain, the clear or borax lake in California, the slopes of the Popocatepetl, in the province of Puebla, Mexico; in Montana, North America, and in the Andaman and the Japanese islands. Supply from these sources is practically impossible, and the whole supply of sulphur to Europe and America is derived from the Sicilian sulphur-deposits, the imports of which into this country arose from 16,686 tons in 1842 to 58,204 tons in 1859,[2] and over 75,000 tons in 1862;[3] and in France, from 6668 tons in 1820 to 33,361 tons in 1855.

Sulphur is found either (*a*) in a pure native state, (*b*) as gas, or (*c*) in mechanical admixtures with clays or other earths. The method of extraction of sulphur when mechanically combined with foreign substances is thus described in Richardson and Watts' "Chemical Technology," vol. i., part iii., p. 314:

"It has already been noticed that the deposits of sulphur are always associated with various mineral or earthy matters, and three processes are followed to separate the principal part of these impurities, which generally amount to more than one-half of the entire weight of the deposit.

"When the deposit is rich in sulphur it is melted in a cast-iron pot, heated by an open fire. The melted mass is stirred with an iron rake to facilitate the separation of the earthy

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[1] See Smee's My Garden.

[2] Richardson and Watts' Chem. Tech., 2d edit., 1863, vol. i., part iii., pp. 2 and 3. This old calcarelle furnace has been greatly improved. It must not be described as a "blast-furnace."

[3] Simmond's Dict. Trade Products, 1863, art. "Sulphur."

matters, which are allowed to fall to the bottom. The liquid sulphur is then removed by a ladle, thrown into an iron vessel, and allowed to solidify. The temperature ought to vary between 250° and 300° Fahr., and never reach 480°, at which point the sulphur would take fire. The residue which remains, and contains more or less sulphur, is removed, and may be treated by either of the following plans:

"A small blast furnace, constructed of fire-brick or stone, is charged with the sulphur-stone at the bottom, which is ignited, and fresh charges of the sulphur-stone are thrown in from time to time. The working holes at the sides admit a small supply of air to support combustion on the surface, by which means sufficient heat is generated to melt the sulphur, which runs off at the bottom through a pipe into an iron pot, where it solidifies.

"The third plan is suitable for treating the impure sulphur-stone, containing from 8 to 12 per cent. of sulphur. It consists of a furnace sufficiently wide to receive two rows of earthen pots —the vessels for distillation—which are arranged in pairs somewhat raised above the sole of the furnace, upon the supports so that the necks of the pots are a little above the top of the furnace. Thus the mouths of the pots are free, and having been charged from without, they are closed by the lids, cemented on, and the distillation begins. The sulphur vapours pass over by the lateral tubes to the receivers, where they condense to liquid sulphur, which flows through into a vessel filled with water, and there solidifies."

We have indicated the three conditions under which sulphur is found. The sulphur in a gaseous state in Iceland, where, besides the large and rapid deposit of the sulphur in and upon the ground, an immense quantity escapes in the sulphureous vapour, is now entirely wasted, but with the adoption of the improved Mexican process an enormous saving would result. Now the whole of this may be recovered by condensing these vapours in clay vessels, a method practised with great success in Mexico, where in certain places the fumes escape from the soil and can be utilised only in this manner. The sulphur thus obtained is required at the mint of the city of Mexico and at the assaying works.

Sulphur is an essential product of volcanic action: now Iceland is *par excellence* the spot of the world where volcanic action is at its maximum, and Iceland, as a consequence, is the spot where sulphur is found most extensively. The districts round the active volcanoes of Etna, in Sicily, and Vesuvius, near Naples, supply the whole amount of sulphur now used. In seeking, then, for a new source of this commodity, we should naturally turn our attention to a volcanic district. And where in the whole world does there exist another country so pre-eminently volcanic as *Iceland?* Its fearful lava-tracts, its vast plains of scoriæ, volcanic dust and ashes, its pools of boiling water, its spouting geysirs, its vast caldrons of seething mud, proclaim its volcanic origin. It owes its upheaval wholly to volcanic agency, and is composed almost entirely of igneous rocks.

While these pages are passing through the press, the volcanic force has broken out in Iceland, and Skaptar Jökull burst into eruption for four days in the month of January last.

The wildest theories have been uttered respecting the modes of origin of sulphur. An inquirer, who investigated the southern Icelandic mines in a superficial manner, has thrown out a theory that the sulphur derived from Krísuvík, and other southern localities, has been produced by the action of water on the sulphurets of iron contained in the rocks. This idea, which rivalled some of the speculations of De Luc, was expressed by him in a paper read before the Society of Arts, on the 15th January 1873. The notion was, that the hidden fires of Iceland dwell in the crust of the earth, and not in its interior; that the boiling springs and mud-caldrons certainly do not derive their heat from the depths of our globe, but that the fire which nourishes them is to be found frequently at only a few feet below the surface, in fermenting matters which are deposited in certain strata! How far this theory is probable may be estimated when we glance at the converse hypothesis, which we must impress upon our readers. The lava at Myvatn is only a few feet, or at most, a few yards, thick; this is clearly shown by the fact that the gaseous vapour escapes from innumerable holes in the lava lying between the mines and the lake. The stoppage of an outlet for

the upward flow of the gas has caused the outbreak of the fluid at spots far distant from the original central "crater" of the sulphur volcano. The geology of Mr Vincent is decidedly vague.

That a great volcanic diagonal line stretches from Cape Reykjanes to the lake of Myvatn, is a theory which is unproven by topographical science, and which a glance at the map, which shows the elevated hills of Lángjökull, Hofsjökull, and Vatnajökull extending across this imaginary line, is sufficient to disprove. The relative elevations of the mountains, from Snæfell on the east, to Eyjafjallajökull on the west, seem to indicate that the central line of volcanic action has been along a line parallel with the south-south-east coast, and which has left the formations in the neighbourhood of Lake Myvatn, with the small volcanic chain of Sellandafjall, Bláfjall, Hvannfell, and Búrfell, entirely to the north. The abrupt escarpment of the greater chain lies along its south-eastern strike, and the fissures along which the parallel rivers from the Jökuldalr to the Hrútafjörðará flow are, according to a well-known geological law, produced on the less inclined slopes. Whilst Mr Vincent's theoretical geology verges on the speculative, his assertion of known geographical facts is inexact.

In 1857, when the temporary cessation of war by England led the British Government to look for fresh sources of gunpowder supply for Europe, Captain J. E. Commerell, of H.M.S. "Snake," was sent to Iceland by the Lords Commissioners of the Admiralty to report upon the capabilities of the mines of Krísuvík and Húsavík. He found the Krísuvík mines, though comparatively close to the sea, did not possess a safe port of debarkation nearer than Hafnarfjörðr. An *ex parte* statement of the "objects, pleasures, and advantages" of the "truly eligible" Krísuvík sulphur mines leaves itself open to severe criticism, and the opinion of Commander Commerell that "the sulphur at Myvatn, though great in quantity, is at too great a distance from a port of embarkation to permit its extraction being carried on with any chance of competing with that from the Krísuvík mines," may be profitably contrasted with that of A. de Capel Crowe, Esq., H.B.M.'s Consul in Copenhagen.[1]

[1] Quoted *in extenso*, Appendix, Section III.

Consul Crowe's remarks as to the richness of these deposits are corroborated by Commander Commerell himself, who says in his report:

"I found at Námarfiall, which lies about six miles to the east of Lake Myvatn, large beds of sulphur in a very pure state; and though the quantities already deposited were very great, no signs appeared of their having been worked."

We shall give the testimony of a few of the more distinguished Icelandic travellers relating to the value of the Myvatn fields. But quotations are only made from authors whose scientific and literary position render their opinion of value and authority.

The testimony of the Rev. Mr Henderson, the celebrated missionary in Iceland, cites the following notorious and well-known facts:

"To the east of Krabla the sulphur mines of Reykjahlid.[1]

"Of the sulphur mountains a particular description is given in the journal.[2]

" . . . Several huge dark mountains that are again relieved in the east by the Námar, or sulphur mountains, from the decomposition going forward, in which a vast profusion of smoke is constantly forming, ascending to a great height in the atmosphere.[3]

"Olafsen and Povelsen, describing two pools on the south-east side of Krabla, *say that the whole region completely answers to the well-known solfatara in Italy.*"[4]

Describing the neighbourhood of Myvatn, he, in an eloquent description, says:

"On either side lay vast beds of sulphur covered with a thin crust, containing innumerable small holes, through which the vapour was making its escape. In many parts the crust, which presented the most beautiful aluminous efflorescence, was not more than half-an-inch in thickness; and on its being removed, *a thick bed of pure sulphur appeared, through which the steam issued with a hissing noise.* The sublimation of the sulphur is produced by the constant ascension of this vapour; and it is

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[1] Henderson's Iceland, 1818, Introduction, p. 4.
[2] *Ibid.*, p. 7.
[3] *Ibid.*, vol. i., p. 160.
[4] *Ibid.*, p. 176.

found to possess greater and less degrees of purity, in proportion as the soil is more or less porous. In general, however, *these mines are* VASTLY *superior to any other in Iceland,* owing to the intense degree of subterranean heat, and the very loose and porous nature of the earth at this place.

"The sulphur mountain rises to a considerable height from the east side of the hollow in which these mines are situate. It does not exceed a mile in breadth, but is more than five miles in length, stretching from the east end of the lake in a northerly direction, between the volcanoes *Krabla* and *Leirhnukr,* where it joins the ridge by which these two mountains are connected. The surface is very uneven, consisting of immense banks of red bolus and sulphur, the crust of which is variegated with random mixtures of yellow, light-blue, and white colours, and in some places a soft sandstone makes its appearance through the predominant mould. I could also observe holes, out of which the sulphur has been dug by the peasants.

"The jetting is accompanied with a harsh roar, and the escape of a vast quantity of vapour strongly impregnated with sulphur. . . . Passing a desolate farm, and keeping at a distance from the sulphur banks, which appeared in the face of a contiguous mountain, we succeeded in reaching the base of Krabla. . . . On the northern margin rose a bank, consisting of red bolus and sulphur, from which, as the wind blew from the same quarter, we had a fine view of the whole. Nearly about the centre of the pool is the aperture whence the vast body of water, sulphur, and bluish-black bolus is thrown up; and which is equal in diameter to the column of water ejected by the *Great Geyser* at its strongest eruptions. . . . What was visible of Krabla appeared covered with the same clay, pumice, and sand as that on which I stood, only diversified by beds of yellow sulphur. . . . To the west of this wilderness lay a number of low mountains, where the *Fremri* Námar are situated. Directly in front was the valley filled with lava above described; near the farther end of which the large columns of smoke ascending from the sulphur springs had a fine effect."[1]

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[1] Henderson's Iceland, 1818, vol. i., pp. 166, 167, 170, 171, 173, 174, 177.

The Rev. S. Baring-Gould, whose researches into Icelandic literature have been of such service to the philologist, gives the following description of the view from the slope above Reykjahlíð, looking across the Lake Myvatn:

"You see the indigo chain of Blafell, beyond which is a *field of sulphur* and boiling mud called Fremri-Námar, not visited by travellers, as it is difficult of access, and inferior in interest to the Námarfjall springs. . . . (From Námarfjall) in half an hour we reach the sulphur mountains, a chain of red hills, perfectly destitute of vegetation. We dip into a glen, and find it full of fumaroles, from which steam is puffing, and sulphur is being deposited. These run along the dale in a zigzag. By the road-side I noticed a block of pure sulphur, from which every traveller breaks a piece, so that in time it will disappear altogether.

"Passing through the Námar-skarth, a winding cleft in the mountains, I came upon a plain of mud, the wash from the hills bounded by a lava-field; the mountains steaming to their very tops, and depositing sulphur, the primrose hue of which gives extraordinary brightness to the landscape. . . . Presently the beautiful Lake Myvatn, or Midge Lake, opened before us, studded with countless lava islets; beyond was the sulphur range, yellow as though the sun ever shone on it."[1]

In Mr Shepherd's work on the North-West Peninsula of Iceland, we find another lucid description:

"We rode to the sulphur mountains on the east of the lake (Myvatn). These large hills are a very wonderful sight. They are of various colours, a variety of mixtures of red and yellow. From their sides are emitted various jets of steam, and *masses of bright yellow sulphur* are strewed all around them. . . . All around the soil was very treacherous, consisting of hot mud, with a covering of sulphur about an inch in thickness, which in most cases was sufficiently strong to bear a man's weight. When the crust was broken, steam issued forth, strongly impregnated with sulphur."[2]

The distinguished Lord Dufferin (the present Governor-General

[1] S. Baring-Gould's Iceland, 1863.
[2] Shepherd's North-West Peninsula of Iceland, 1867, p. 157.

of Canada) in his charming book, "Letters from High Latitudes," says:

"Opal, calcedony, amethyst, malachite, obsidian, agate, and felspar are the principal minerals; OF SULPHUR THE SUPPLY IS INEXHAUSTIBLE."

M'Culloch's "Geographical Dictionary," vol. i., p. 585, under the heading "Iceland," says:

"Few metals are met with. Iron and copper have been found, but the mines are not wrought. THE SUPPLY OF SULPHUR IS INEXHAUSTIBLE; large mountains are encrusted with this substance, which, when removed, is again formed in crystals by the agency of the hot steam from below. Large quantities were formerly shipped; but latterly the supplies sent to the foreign market were comparatively small."

"Chambers's Encyclopædia," under the heading "Iceland," vol. v., p. 505, says:

"The mineral wealth of Iceland has only begun to be developed. IN NO PART OF THE WORLD IS SULPHUR FOUND IN SUCH ABUNDANCE."

An adequate idea of the value of the Icelandic sulphur fields, as compared with those of Italy, cannot be conveyed by the reports of travellers. To thoroughly comprehend this, we must bear in mind the reproductive properties displayed by solfataras, and the best means suggested by practice to extract the sulphur and yet not interfere with this peculiarity.

The process for the separation of the sulphur at the celebrated solfatara of Pozzuoli, near Naples, where the sulphur is condensed in considerable quantities amongst the gravel collected in the circle which forms the interior of the crater, is conducted as follows: The mixture of sulphur and gravel is dug up and submitted to distillation to extract the sulphur, and the gravel is returned to its original place, and in the course of about THIRTY *years* is again so rich in sulphur, as to serve for the same process again.[1]

We thus see that the reproductive process occupies a period of THIRTY *years* in the Italian mines, whereas the same results

[1] Ure's Dict. of Arts, Manufactures, and Mines, 1860, vol. iii., p. 830.

are produced in THREE years in the Icelandic mines, *i.e.*, that A GIVEN AREA IN ICELAND WILL PRODUCE TEN TIMES THE QUANTITY OF SULPHUR, OR IS TEN TIMES AS VALUABLE, AS THE SAME AREA IN ITALY.

"The permanency of the volcano, as a source of sulphur, would depend on the rapidity with which the sulphur would be replaced, after the sand had been once exhausted. The time required for this is not necessarily fixed to periods of twenty-five or thirty years. In Iceland, at a similar spot the sulphur is renewed every two or three years."[1]

The nearest port suitable for shipment of the sulphur is "Húsavík," situate in the Bay of Skjálfandi; it is perfectly accessible at all times of the year. Mr Consul Crowe having been questioned on the subject, states[2] that:

"The Icelandic ports are, owing to the influence of the Gulf Stream, in ordinary years accessible to shipping all the year round, and shipments can safely be made during seven months at ordinary rates of freight and insurance. Húsavík, as a rule, is never frozen up, the only impediment to free navigation being the floating ice which at certain seasons is loosened from Greenland, and may for a time lie off the coast. Such occurrences, however, have their stated times and seasons, which are well known to navigators in those waters; in some years there are no hindrances of the kind at all, and shipments in good vessels may be made all the year round. In support of this statement, I may mention the fact that steamers leave Copenhagen for Iceland as late as the middle or end of October, and would do so later were there sufficient goods or passengers to make them pay. Again, the Iceland 'Althing' have recently proposed to raise funds for running steamers round the island '*all the year*,' and thus supply the want of internal communication; and, if the proposal fell through, it was only on financial grounds, and not from inaccessibility of ports from ice. I am therefore simply repeating facts in stating that, as a rule, Iceland navigation is free all the year round. *The island is but a two days' journey*

[1] Dr F. J. Mouat's Adventures and Researches among the Andaman Islanders, 1863, p. 169.

[2] Letter of A. de C. Crowe, Esq., 27th June 1872.

from Scotland, and with suitable vessels an almost uninterrupted intercourse might, in ordinary seasons, be kept up. In further confirmation of what I have stated, I may add that this same warm current from the Mexican Gulf, which is so beneficial to Iceland, keeps also all the Norway ports, from the Naze to the North Cape, ice-free all the year round."

The road from Hafnarfjörðr to Krísuvík will certainly be improved by the formation of a railway.

It has been said by Professor Paijkull that this road is one of seven or eight hours' journey.

"This road is one of the best in Iceland. The 'heiði' south of Húsavik is free from stones, and is level, although only sparsely overgrown with grass. Neither are there any hills or fjelds to be met with along it, and there are only a few small streams to be crossed. The last few miles north of Myvatn certainly consist of a sandy plain, but it is tolerably level, and the road is pretty good, owing, I suppose, to the sulphur traffic from the solfataras, near Myvatn, to Húsavik, in former days, in which 100 horses are said to have been employed at one time."[1]

In 1868, the late foreign minister of the United States, Mr W. H. Seward, one of the most far-sighted statesmen which that country has ever produced, was able to anticipate the future importance of the Iceland sulphur mines both to Europe and to America. It was even proposed that the United States Government should purchase both Iceland and Greenland, as well as St Thomas, from the Danish Government. To promote this object, Mr B. M. Pierce was sent to Iceland to report on the mines. Extracts from his report are subjoined:

"The sulphur mountains, beds, and mines are very rich and extensive, easily worked, and of immense value. The sulphur is supplied at half the cost of that furnished by the Sicilian mines, which it is believed will soon be exhausted. *The possession of these mines as a part of our territory is a question of vital magnitude.*

". . . By the way of Reykjahlid and Krabla, where are the most extensive sulphur deposits of the island.

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[1] Paijkull, pp. 217, 244, 245, 246, 247.

"There are two principal fields of sulphur in Iceland; one near Krabla and Reykjahlid in the north-eastern, the other at Krísuvik in the south-western corner. *The former is by far the most extensive region,* but the latter gives the purer product. Every traveller gives us a description, more or less minute, of these sulphur hills, and the beds of pure yellow, often a foot thick, which extend about them. Up to a few years ago the sulphur had only been explored in the rudest way by the natives. The industry thus carried on was almost insignificant in result, and was soon abandoned when the supply of surface material became scanty. Still the exportation of sulphur was enough during the days of the peasant mining to give the brightest hopes of what it would be under enlightened management and economy. One of the most interesting and remarkable facts connected with these mines is that a region apparently exhausted becomes re-sulphurised again, so that the stores of brimstone are PRACTICALLY as INEXHAUSTIBLE as those of the infernal regions. Although the mines of Krísuvik are twenty miles from Hafnarfjörðr, one of the best harbours in the island, and those of Krabla are farther still from the seaboard, and from the principal trading station of Húsavik, it would appear that pure Icelandic sulphur is excessively cheap, half the price, say some, of Sicilian sulphur. *With improved means of transportation it would control the market.* The Oxonian, remarking on this, says (p. 138), 'like everything else in Iceland, the light is under a bushel.' Our most trustworthy information comes from Forbes, who, being an officer, sees the importance of the sulphur supply, and enters energetically into a thorough discussion on the prospects of the Iceland beds. We shall give the substance of what he says: 'The deposits are formed by the decomposition of the sulphurous fumes that burst up from the ground, and afterwards sublimate as solid sulphur. A part is mixed with clay; a part is almost pure sulphur, containing but 4 per cent. of gangue. The number and energy of these sulphur gases continually coming up is incredible. The sulphur earth, or impregnated clay, averages from 6 feet to 3 feet in thickness, and contains 50 or 60 per cent. of pure sulphur.'

"Sulphur is found also at Námafjall, in the north of Iceland,

in geological circumstances analogous to those of the beds at Krísuvik. It is found there generally in concrete masses of a citron-yellow colour, quite pure, sometimes very plentiful, and generally associated with lime and silica. It is to be regretted that the Danish Government does not favour this industry, which would furnish as fine sulphur as that of Sicily, and doubtless at a lower price. Besides, Denmark possesses in Iceland immense stores, which will one day be of great value to her when those of Sicily are exhausted."

Before the concession was granted to Mr Lock, Professor Johnstrüp was sent by the Danish Government to survey and make plans of the mines. His report is inserted at length:

"Referring to the consul's request to me in date of the 27th of last month, I beg to inform him that on the journey which I made last year to Iceland I visited the sulphur mines belonging to the State there, which lie to the east of Myvatn, and I made maps of them, which were sent to the Minister of Justice, who will, no doubt, let you have copies of them. From these you will be able to see that the richest mines are to be found in that part called Reykjahlidar-Námar, where large deposits of the purest sulphur are to be found.

"The reproduction is *incessantly* going on from about *a thousand small eminences* (*solfataras*), which are found on the ridge, along the sides, and at the foot of Námarfjall.

"Further rich sulphur mines are to be found at the Kétill crater, called the Fremri-Námar, while the least rich mines are the so-called Krabla-Námar, but also at these there is a continual production of sulphur going on. The first-mentioned mines ARE THE RICHEST TO BE FOUND IN THE WHOLE OF ICELAND, and have the advantage of lying in the *track of a* PRACTICABLE ROAD *to the shipping port of* HÚSAVIK, WHICH ROAD IS AMONG THE BEST IN THE ISLAND. As regards the position of the mines, I must refer you to Olsen and Gunnlaugsson's map of Iceland, on which they are marked. It will be a pleasure to me should these particulars be of service to you.

"(Signed) J. F. JOHNSTRÜP,

"*Prof. Mineralogy at the Copenhagen University.*

"*April* 30, 1872."

The examination of these facts is quite enough to show the inquirer that the transit from Myvatn to Húsavík is more practical, and of more easy access, than that from Krísuvík to any of the ports at the south-west corner of the island, which have been extolled by Mr Vincent in his *ex parte* glorification of the Krísuvík mines. We will now turn to the testimony of a far greater traveller, whose opinion on the subject ought, indeed, to be regarded as final. Captain R. F. Burton, in his recent exploration of Iceland, devoted much time to the examination of the Myvatn sulphur deposits. The great question is answered by him in the following letter which appeared in the London *Standard*, Nov. 1, 1872:

"Sir,—Perhaps you will allow me, in continuation of my letter of October the 14th, to attack the subject of the sulphur deposits in Iceland now belonging to British subjects.

"For many years these diggings, so valuable since the exhaustion of the supply from Sicily, were a bone of contention between France and England. . . .

"Denmark can hardly work the mines for herself without a great expenditure of capital, which will find its way into Icelandic pockets, and thus she wisely leases her property to strangers. She relies upon the fact that sulphur has risen from £4, 10s. to £7 per ton, and consequently that her Iceland diggings must become more valuable every year.

"I spent three days—from August 7th to August 9th, 1872—at the solfataras of Mý-vatn, or Midge Lake, situated to the north-east of the island. I lodged at the farm of Reykjahlíð (reeky ledge), under the roof of the well-known Hr Pètur Jónsson, whose alacrity in composing a bill of charges has won for him a wide reputation.

"On Wednesday, August 7th, I set out under the guidance of this worthy to inspect the diggings of Krafla, generally but erroneously written Krabla. And now a verbatim extract from my diary will assure the reader that my statements are completely free from the process called 'cooking.'

"Rode to Leirhnúkr (mud knoll) in one hour fifteen minutes. At once understood an *emplacement* very imperfectly described by old travellers. It is the northern head of a spine, a sharp prism

about one mile broad, with a magnetic direction of 215 deg., in fact, nearly due north—south. It is a mass of Palagonite (sea-sand forming a stone), everywhere capped by spills and gushes of modern lava, *and sulphur abounds* at the junction of these formations. The hillock of *Leirhnúkr is one vast mass of sulphurous deposits.* I counted seven wells upon the slope, whilst the lowlands around were spotted with unwholesome-looking eruptions. Rode east to Helvíti, which the Rev. Mr Henderson described in 1815 as a crater, not unworthy of its grim name. 'Hell,' here as elsewhere, has been 'dismissed with costs,' the placid blue lake, ruffled at times by the passing breeze, and blowing off odours the reverse of Sabæan, is now hardly worth visiting. At Hrafntinnuhryggr (raven stone ridge)—excuse the word, I did not make it—expected to find, as the 'Obsidian Mountain' has been described, 'a heap of broken wine bottles shining with their jet-like colouring.' Found nothing of the kind, but picked up some decent specimens. Rode back much edified, etc., etc. . . .

"On the next day rode to the Fremrinámar (outer warm-springs) to the south with some easting to Reykjahlíð. Found the road utterly dissimilar to anything laid down in maps. After four hours thirty minutes of rough travelling, reached the *deposit which has been worked for some generations, but which cannot be said to have been* EVEN SCRATCHED. The 'lay' is upon the north-eastern, the eastern, and the southern flank of a crater, described by the late Professor Paijkull as 'probably the largest in Iceland.' *Immense deposits covered the ground, and white fumes everywhere filled the air. Whole torrents* of what Mr Crookes calls the 'mainstay of our present industrial chemistry'—I mean *sulphur—have here been ejected.* Could not count the hissing 'hot coppers,' popularly called fumaroles. Returned after a stiff ride of eight hours thirty minutes, which gave a fine view of the Ódáða Hraun, the 'great and terrible wilderness' of lava to the south-west, etc. . . .

"August 9th was a lazy day, spent in preparing for a trip to the desert. Inspected the Hlíðarnámar (ledge springs), from which the farm of Reykjahlíð takes its name. Bravely objected to be deterred by the 'smell of rotten eggs,' by the 'suffocating fumes,'

and by the chance of being 'snatched from yawning abysses by the guide's stalwart arms.' Perhaps the conviction that the abyss nowhere exceeds three feet in depth may account for my exceptional calmness in such deadly peril. The Hlíðarnámar, or Ledge Springs, lie west of the sulphur mountain, and on a lower plane than the eastern deposits. They are bounded north by two lava-streams issuing from the base of the Hlíðarfjall, and south by independent outbreaks of lava, showing hosts of small detached craters. East is the hill, and west the Mý-vatn water, and its selvage of fire-stone. The area of this fragment of the grand solfatara may be one square mile.

"The spade deftly wielded threw up in many places pure flowers of sulphur. According to Dr Augustus Vöelcker, this bright yellow matter gives 95·68 per cent., and according to the Icelandic traveller Ólafsson, it is readily renewed. Below the golden colour usually is a white layer, soft, acid, and mixed with alum; it is calculated to yield 20 to 30 per cent. Under it again are the red, the dark purple, the chocolate, and other tints, produced either by molecular change in the mineral, or by oxygen which the sulphur no longer modifies. Here the material is heavy and viscid, clogging the spade, and the yield is reported at 50 to 60 per cent. These figures will show the absolute value of the supply. Beneath, at short distances, say at three feet, lies the ground-rock, invariably Palagonite: thus 'falling in' merely means dirtying the boots. Between the yellow outcrops stretch gravelly tracts which the spade showed to be as rich as the more specious appearances. Many of the issues are alive, and the dead vents are easily resuscitated by shallow boring, in places even by pulling away the altered lava-blocks which cumber the surface.

"Leaving my horse in a patch of the wild oats that everywhere characterise this region, I walked up the sulphur mountain, whose white and yellow washings, so conspicuous from afar, prove to be sulphur, stones, and sand deposited by the rain upon the red clay. Here we picked up crystals of alum and lime and fragments of gypsum and selenite. The crests and box-shaped masses of Palagonite and altered lava gave fine views of the lowlands. On the summit we found some small

mud-springs, which Iceland travellers have agreed to call by the corrupted name 'Makkaluber;' the people know them as 'Hverar.' This peculiarity is therefore not confined, as writers assert, to the eastern hill feet. The richest diggings lie below the crest, and here the fumes escape with a fizz and a mild growl, which vivid fancy has converted into a 'roar.' *I returned from the immense soufrière vastly edified with the spectacle of so much wealth lying dormant in these days of capital activised by labour*, etc., etc. . . .

"To the question, 'Will this sulphur pay its transport?' I reply unhesitatingly, Yes, if great care and moderate capital be expended upon the mines. In the first place, the live vents which waste their sourness on the desert air must be walled round with stones, or, better still, with planks, and the fumes should be arrested, as in Mexico, by pans and other contrivances. The working season would be the summer, AND THE QUANTITY IS SO GREAT THAT MANY SUMMERS MUST ELAPSE BEFORE THE THOUSANDS OF TONS WHICH COMPOSE EACH SEPARATE PATCH CAN BE CLEARED OFF. In winter the produce can be sent down to Húsavík (House's Bay), by sledges, not the Esquimaux-like affair at present used in Eastern Iceland, but the best Norwegian or Canadian. The road is reported by all travellers to be exceptionally good, running for the most part over gently undulating heaths, overlying basalt. There are no rivers of importance on the way, and the fall is about 1500 feet in forty-five English statute miles. The line is wrongly placed in Gunnlaugsson's map: it runs on the eastern, not the western shore of the Langavatn, and it passes to the east of the celebrated Uxahver. I am also assured that the much-abused Bay of Húsavík is a safe harbour, when proper moorings are laid down, that no vessel has been lost there during the last thirty years, and that Captain Thrupp, of H.M.S. 'Valorous,' judged favourably of it. This also was the verdict of an old Danish skipper, who assured us that during the last twenty-five years he has been trading between Copenhagen, Hull, and Húsavík, reaching the latter place about the end of February, and making his last voyage home in October. During the 'balance' of the year masses of floe-ice prevent navigation.

"From such a speculation present returns may be expected. When income justifies the outlay a tramway would greatly cheapen transit. The ships which export the sulphur can import coal, and now that the officinal treatment of sulphur has been so much simplified by the abolition of train-oil, nothing else except pressed hay for the cattle is wanted. When one patch is exhausted, the road can be pushed forward to another. I am persuaded that the *whole range, wherever Palagonite and lava meet, will be found to yield more or less sulphur.* Of course it will be advisable to purchase sundry of the farms, and these, in Iceland, range in value from £300 to £800 maximum. The vast waste lands to the east will carry sheep sufficient for any number of hands; and good stone houses will enable the Englishman to weather a winter at which the Icelander, in his wretched shanty of peat and boarding, looks with apprehension. I have already spoken about the excellence of the summer climate, and any gazetteer shows that the change of temperature at Montreal is more to be feared than in Iceland.

"I am, &c.,

"RICHARD F. BURTON.

"ATHENÆUM,
"*October* 16, 1872."

The very language of Iceland seems to indicate the importance of its sulphur deposit. It is a significant fact that the Icelandic language indicates sulphur as the "burning-stone," *Brennisteinn,* unlike the Danish *Svovel,* which is obviously derived from *Sulphur,* Lat.

Mr Vincent's theory that sulphur is produced by the action of water on pyrites, though having some elements of probability in it, is nevertheless entirely unproven in the present state of science, and it is most unfortunate that throughout his paper, theory and fact are mingled in equal proportions, each being independent of the other. "*Tant pis pour les faits.*"

It was left for Captain Burton to point out that the testimony of Commander Commerell, which appears in Mr Vincent's paper to make the transit from Krísuvík to Hafnarfjörðr a real path of

roses, did not actually speak with such unqualified enthusiasm. Commander Commerell says:

"A tramway might also be laid down, but as there are two hills to cross, with other difficulties, I could not positively state whether this were possible or not."

Another objection by Captain Burton appears to be of greater force. It is alleged that the Krísuvík deposits extend over an area of twenty-five miles. No precise geological map is given of the locality, and it is most significant that when Captain Burton and Mr Chapman rode from Krísa's Bay, eastward to the Little Geysir, and although they looked anxiously for the enormous area theoretically assigned to the sulphur-formation, they failed to see any sign of it. The sulphur, like the Spanish fleet, was not in sight; and the absence of the Palagonite, which is invariably in other Icelandic localities found in juxtaposition with the sulphur, ought to hint to geologists the true state of the case.

The Danish Government were not slow to perceive, and have on numerous occasions endeavoured to attract attention to, their valuable mineral products. Mr Lock, an Englishman, some years ago petitioned the Danish Government, and expressed his wish to take a lease of the sulphur mines at Myvatn. A committee was elected by the Icelandic Althing to report upon this subject. This report, which is dated the 14th August 1869, exhibits the utmost timidity in permitting an alien to acquire rights over the mineral products of Iceland. It is given at full length in the terminal notes to this paper.

It is not here necessary to narrate the circumstances under which the Danish Government declined to adopt the local recommendation. It will suffice to say that on the 13th April 1872, a contract was signed between Alfred G. Lock of London and the Danish Minister of Justice, Andreas Frederik Krieger, on the part of the Danish Government. This contract will be found in full in Note No. 1. The lease lasts for fifty years, and the terms, although costly to the English concessionaire, were satisfactory to the Danish Government. The greatest possible irritation has consequently been produced among a very small section of "Home Rule" Icelanders, who objected to the work-

ing of the mines by a stranger. The matter, however, being entirely taken out of their hands, their criticism on the arrangement becomes a mere historical question.

A fuller description of Mr Lock's property will be of interest to the English inquirer, as it shows to what an extent capital may be productively invested.

Description of the Property.

The property comprises the solfataras or sulphur springs, the sulphur banks or fields, and the sulphur quarries belonging to the State of Denmark, and situated in the Things Syssel in the north and east provinces of Iceland.

The sources of sulphur in this property are threefold :

1st. The *solfataras*, or sulphur springs.

2d. The *sulphur banks*, or fields.

3d. The *sulphur quarries.*

The Solfataras.—Sulphur is formed by certain gases generated underground by volcanic action, and in solfataras these gases find their way to the surface of the earth through sand, ashes, or other volcanic substances, and in their passage sublime and deposit a certain portion of their sulphur, a certain amount escaping into the air.

This formation of sulphur is continuous and increasing, and in proportion to the strength of the volcanic influences so is the rapidity with which the sulphur is formed and the amount taken from the solfatara replaced. For this reason they are called "living."

The solfataras of Italy require a period of twenty-five or thirty years to renew the sulphur in sufficient quantities to pay for extraction, whilst these are said to require only three years to produce the same result, the same area of solfataras in Iceland being consequently ten times as valuable as an equal area in Italy.

The methods of extracting the sulphur from these are most inexpensive, and the plant required of the simplest description.

The gases at present escaping into the air can be condensed and the sulphur obtained in a pure crystallised state, without any expenses for refining, by collecting the gases in clay vessels.

2d. *The Sulphur Banks*, or Fields.—The gases before mentioned escaping into the air condense and deposit sulphur, which, were the atmosphere always calm, would be precipitated in regular banks, but owing to the constant shifting of the wind it is blown in all directions, forming layers varying from a few inches to several feet in thickness, and extending over vast areas of the surface of the surrounding ground.

3d. *Sulphur Quarries.*—In these localities the accumulation of sulphur has ceased, and when once extracted is not replaced; they are therefore called "dead." The sulphur is found imbedded in, and mixed with, lime, clay, etc., and nearly all the sulphur exported from Sicily is obtained from this description of sulphur-bearing strata.

The same kind of strata exists in the Romagna in Italy, and in some districts of Spain, but in the Romagna the deposit is 390 feet below the surface, and only yields, in the furnaces, 15 per cent. of sulphur, while the best of those in Spain are from forty to sixty feet below the surface, and contain a varying quantity of sulphur of from 21 to 36 per cent.—the poorest strata being nearest the surface—whilst these (in Iceland) are upon the surface; and Henderson, the missionary, a most trustworthy authority, describes a valley one mile wide and five miles long in the neighbourhood of Krabla, the surface of which is very uneven, and consists of immense banks of red bolus and sulphur, with mixtures of yellow, light-blue, and white coloured earth.

Forbes found similar clays to contain, the white from 30 to 40 per cent., and the red and blue clays about 16 per cent. of sulphur.

The plans made by J. F. Johnstrüp, Professor of Mineralogy at the University of Copenhagen, by order of the Danish Government, and attached to the leasing contract, a copy of which will be found in the Appendix, show the solfataras, or living sulphur-fields, to extend over a district of more than SIX SQUARE MILES, viz.:

		Acres.	Sq. miles.	Acres.
No. 2. Krabla-námar,	about	1998	= 3	78
No. 3. Reykjahlid-námar,	„	1068	= 1½	108
No. 4. Fremri-námar,	„	808	= 1¼	8

As a gauge of the value of the Icelandic sulphur-fields we have been describing, it would be well to compare them with those of other countries. To arrive at this result, we shall give a comparison of the estimated cost of Sicilian and Spanish sulphur, and contrast it with that derived from Iceland.

COST OF THE SICILIAN AND SPANISH SULPHUR COMPARED WITH THAT OF THE ICELANDIC.

Cost of Sicilian sulphur, according to Signor Parodi's Report to the Italian Government, vouched by English engineers, viz.:

	Per ton of sulphur. Fr. c.	
Excavation of mineral,	13 0	
Oil and tools,	5 0	
Extraction of mineral,	16 5	
Pumping,	10 0	
Fusion,	5 5	
General charges and taxes,	11 0	
Carriage from mines to port,	20 0	
Rent to proprietor of soil,	15 0	
	96 0	= £3 16 10

TO ENGLAND.

	£ s. d.	
Freight,	1 0 0	
Export duty,	0 8 0	
Port charges, commission, etc.,	0 4 6	
Insurance, brokerage, etc.,	0 8 0	
		2 0 6
Cost of Sicilian sulphur, per ton,		£5 17 4

"*Estimated cost of Spanish sulphur,* from a Report by Mr J. Sopwith to the Hellin Sulphur Company:"

The first tin contains 21 per cent. of sulphur.
,, second ,, 36 ,, ,,
,, third ,, 28 ,, ,,

It takes six tons of Spanish ore to make one ton of sulphur.

	Per ton of sulphur. £ s. d.
Cost,	2 13 0
Carriage to railway station,	0 2 4
Railway carriage to Cartagena,	0 6 6
Loading, etc.,	0 4 6
Freight from Cartagena to England,	0 14 0
Royalty to Government,	0 2 8
Insurance,	0 8 0
Estimated cost of Spanish sulphur,	£4 11 0

"This sulphur should be worth, either in England or Marseilles, from £6 to £7 per ton.

"Flowers of sulphur would cost £6 per ton, and their value would be £10."

Estimated Cost of Icelandic Sulphur.

Although from the fact of the deposits of the sulphur producing clay, sand, ashes, etc., in Iceland being on the surface, the working expenses of excavation (and from the closer proximity to the coalfields of England, the cost of extraction) must be far less than those of Sicily, yet it has been thought advisable to be on the safe side by taking the costs of excavation, extraction, and fusion, to be in each case the same.

The expenses of bringing the sulphur to this country will then be:

	Per ton. £ s. d.
Excavation of mineral,	0 10 10
Oil and tools,	0 4 2
Extraction of mineral,	0 13 9
Fusion,	0 4 7
[1] Carriage to port of shipment,	0 15 0
[1] Freight to United Kingdom, including insurance,	0 10 0
Estimated cost of Icelandic sulphur,	£2 18 4

[1] These two items are calculated at excessive and extravagant rates. The first item (15s. per ton) was supplied by an eminent shipowner, and the amount of freight is also overstated.

	Per ton. £ s. d.
Cost of Sicilian sulphur,	5 17 4
,, Icelandic ,,	2 18 4
Profit in favour of Iceland,	£2 19 0

	Per ton. £ s. d.
Estimated cost of Spanish,	4 11 0
,, ,, Icelandic,	2 18 4
Profit in favour of Iceland,	£1 12 8

Estimated Profit on Icelandic Sulphur.

The market price of sulphur ranges from about £6, 5s. per ton for third quality to £8 for best. As by far the greater part of the Icelandic sulphur would be best quality, its average market price may be safely put at £7 per ton.

	£ s. d.
Market price,	7 0 0
Cost price,	2 18 4
Estimated profit per ton,	£4 1 8

Estimated Profit per Annum.

Italy, in the year 1870, exported 52,546 tons. From the comparison between the relative formations, there is every reason to believe that as large a quantity can be exported from Iceland as from Italy; but, supposing that for the first year or two only one-third that quantity is exported, viz., 17,515 tons, at a profit of £4, 1s. 8d. per ton, the annual profit would amount to over £71,500.

NOTE I. TO SECTION V.

(*Translation.*)

LEASING CONTRACT.

The undersigned, Andreas Frederik Krieger, His Majesty the King of Denmark's Minister of Justice, Commander of the Dannebrog and Dannebrogsmand, Commander of the Order of the North Star, in virtue of the authority given him by a Royal Resolution of the 9th March 1872, hereby grants to Alfred G. Lock, of London, a lease of the sulphur mines belonging to the State, situated in the Thing Syssel in the North and East Provinces of Iceland, on the following conditions:

I. Exclusive right to work the above-mentioned mines is given to the lessee for the duration of the lease; they consist of the so-called Reykjahlidar, Krabla, and Fremri-Námar; on the other hand, the present contract gives the lessee no right to the use of, or to the possession of the land around the mines, which ground does not belong to the State. It must be remarked that the mines on the church lands at Theistareykir are not included in this leasing.

II. The lease is given for fifty years, reckoned from the 1st September 1872 to the 31st August 1922, without either of the contracting parties having the right to withdraw from it. Liberty, however, is conceded to Alfred G. Lock to withdraw from the contract at any time before the 31st August this year, date inclusive.

The lessee can make over his rights acquired by this present contract, together with his obligations, to other parties, against whose respectability and solvency no reasonable objection can be made, but he shall nevertheless be bound to communicate such transfer to the Ministry of Justice. His rights likewise shall at his death be transmitted to his heirs.

III. Full liberty is given to the lessee as regards the working of the mines. The sulphur, however, must not be washed in running waters which have their outlet in the sea, nor in fishing-

waters, and as a matter of course the sulphur beds or mines must not be destroyed, with respect to which it is remarked that the earth during the diggings must not be trodden down into the warm beds, which are designated by a green colour in the maps attached to the contract, which in the year 1871 were made by J. F. Johnstrüp, Professor of Mineralogy at the Copenhagen University.

On the delivering over of the mines a survey will take place, at which the maps in question will be used as guides. On the delivering back of the mines a survey shall likewise take place.

IV. Neither the lessee nor the workmen he employs at the mines shall be subject to any extraordinary taxes or imposts by the State or the municipality, other than those imposed on the other inhabitants of the island; and he shall in this respect enjoy the same rights as natives; but, on the other hand, he shall not be exempted from the ordinary taxes and charges imposed by the general laws of the land.

V. The lessee shall be bound to allow the State authorities to inspect the mines whenever they may think fit to do so.

VI. The lessee shall pay an annual rental of £50 for the first year; £60 for the second year; £70 for the third year; £80 for the fourth year; £90 for the fifth year; and £100 for the sixth and for each of the succeeding forty-four years.

The rental shall be paid *in advance* to the Minister of Justice in Copenhagen in two half-yearly payments,—viz., on the 1st September and 1st March, each time with the half part of the yearly amount. The first time on the 1st September 1872, with £25, for the half-year from that day to the 28th February 1873.

The lessee shall, on the signing of this present contract, as security for the due payment of the rental and the proper working and redelivery of the mines in an uninjured condition, deposit a sum of 5000 rixdollars in the private bank of Copenhagen, in such manner that the Minister of Justice retains the certificate of deposit in his possession, and can, without trial or sentence, and without the lessee's authority, take them out of the private bank, which institution shall be forbidden to return them to the lessee or others without the Justice Minister's permission.

As long as the above-mentioned amount is deposited in the private bank the interest of the sum may, without let or hindrance from the Minister of Justice, be paid to the lessee or his representatives.

On the expiry of this leasing contract and the redelivery of the sulphur mines in an uninjured state, the Minister of Justice shall be bound to return the certificate of deposit to the lessee or other duly authorised persons.

VII. Should the rental not be paid at the proper times, and should the lessee destroy the mines, he (the lessee) shall lose the rights conceded to him by this contract, and the Minister of Justice shall in such case be empowered to take from him the lease (eject him from the mines), and the deposit money be forfeited to the Iceland Land Fund (State Fund). Should, however, a breach of contract take place only through omission to pay the rental, and the collective amount of the rentals still to be paid be less than the deposit, the Minister of Justice will refund the difference.

VIII. Should the lessee not have removed, within two years from the expiry of this contract, or from the date of its annulment (see § 7), all buildings, machinery, and the like put up at the mines, they shall become the property of the State without indemnity.

IX. Disputes arising as to whether the lessee's treatment of the mines is destructive to them, shall be settled by arbitration, each of the contracting parties choosing one man, and these latter in case of disagreement to choose an umpire. If from any cause an arbitration cannot be obtained, the parties at issue are empowered to appeal to the law courts; as likewise in all other disputes arising out of this contract, in which cases the Royal Supreme Court of Copenhagen shall be the proper tribunal; for which reason the lessee, on signing this contract, shall appoint a Copenhagen resident, who on his behalf shall receive summonses for his appearance. Should the Minister of Justice think fit to take law proceedings against him in Iceland, he (the lessee) shall be bound to receive summonses at the sulphur mines for his appearance at the Iceland courts.

X. The expense of drawing up this contract, with the stamped

paper and registration, as well as the expense of surveys on the delivering over and the delivery back of the mines mentioned in this contract, shall be borne by the lessee.

The contract shall be drawn up in duplicate, of which the one copy is held by the Minister of Justice and the other by Mr A. G. Lock.

On the above conditions I, Alfred G. Lock, of London, have signed the present contract.

Copenhagen, 13th April 1872.

(Signed) KRIEGER.

(Signed) { For Alfred G. Lock, A. DE C. CROWE.

Witnesses—

(Signed) RICARD.
(„) POULSEN.

The value of the stamp on this contract is calculated at 9 rigsd. to the pound sterling.

NOTE II.

REPORT OF THE ALTHING.

REPORT drawn up by the Committee elected for this purpose by the Icelandic "Althing" of 1869, translated after the original Icelandic text from the "Althing" reports.

We, the undersigned, have, by the honourable "Althing," been elected into a Committee, to state our opinion as to a memorial which about three years ago has been sent in to the Government by an English gentleman, Mr Lock, importing his wish to take lease of the sulphur mines in the north of Iceland, situated between 65° 20′ north latitude and the Arctic Sea, or, otherwise speaking, the mines lying on the said tract, east of "Myvatn" (Gnat Lake) and west of Jökulsá (Glacier River).

Before stating our opinion about this matter, we think it necessary that it should be clearly understood by the honourable Assembly—

1. How the matter now stands with the sulphur mines in question.

2. What right the Government has to lease out these mines without incurring some obnoxious consequences to the lease-holder, or to other parties concerned.

The sulphur mines that are at the disposal of the Government[1] are those of "Reykjahlid," "Kráfla-námar" (the mines of the Krafla mountain), and "Fremri-námar" (the mines farthest from the coast), but "Theistareykja-námar" (the mines of Theista-reykir) have never been Government property, although they apparently are lying in the tract of which the above-mentioned Mr Lock has wished to take lease.

As it is well known, from the excellent essay by the Right Reverend Hannes Finnson, Bishop of Iceland (see "Rit hins islendska lærdómslista-fèlags"—the Works of the Icelandic Society of Learning and Arts—vol. iv., p. 29), Mr Paul Stigsson, superintendent or governor of Iceland, bought of the Thorsteins-sons, so called, in the presence of Mr Hans Nilsson and Mr Hans Lauritsson, on the behalf of his Majesty Frederik II., the mines of which there is no question here, with the exception of the Theistareykja mines, or more properly speaking, the right of digging sulphur in these mines. This bargain was made at Eyjafjord on the 15th of August 1563, and the said Thorsteins-sons gave up the sulphur-diggings in "Fremri-námar," "Kráfla-námar," and "Heidar-[2] (heath) námar;" but it is nowhere on record, that any land or ground for house-building and road-making has been comprised in this bargain. As it appears, the Government of his Majesty Frederik II. has thought it sufficient to acquire the monopoly of the sulphur that was to be found there, for, as it appears, there has, as a rule, never been lack of persons willing to dig out the sulphur and to carry it, like *other merchandise*, down to the sea-coast.

[1] A certain Hr "Thorlákur O. Johnsen," whom I met in Iceland, wrote to the *Standard* (Nov. 16, 1872), and asserted my "entire ignorance" concerning Iceland generally, and the relationship between Denmark and Iceland in particular. What his ignorance, or rather dishonesty, must be, is evident when he states a little further on: "As to the so-called wisdom of the Danish Government in leasing the mines to strangers, there can be only one reply, that *all the mines in Iceland, whether of sulphur or other minerals, belong to Iceland and not to Denmark.*"—R. F. B.

[2] I presume this to be a clerical error for "Hlíðarnámar" (Ledge-springs).

In this manner the above-mentioned mines were worked in the time of his Majesty Frederik II., and a great quantity of sulphur was dug up there. It is said that the profit has sometimes, in the said period, amounted to 10,000 rixdollars (or upwards of £1100), and that the total export of sulphur has gone up to about 200 commercial lasts (or 400 tons) a year.

In the time of Christian IV. the working of the mines, which had answered so well in the time of his father, was almost discontinued; and the attempts of this king to let the mines, for a period of fifteen years, to Mr Jorgen Brochenhuus, of Wolderslev, and Mr Svabe, proved a complete failure. Thus, in the time of Christian IV., the mines were of little consequence for the Government and the country. This, the Right Reverend Hannes Finnson says, was a great drawback for the Danes, as it caused the scarcity of powder, which was one of the reasons why the Danes were defeated by the Swedes in Holstein in 1644.

Shortly after the middle of the seventeenth century, or in the year 1665, a certain "assessor," Gabriel Marsilius by name, acquired a concession of digging sulphur and exporting it from Iceland; and it is said that he has exported from here a very great quantity of sulphur with considerable profit. Since that time, or since 1676, little is said of the sulphur-mining in Iceland until the first part of the eighteenth century; then, in 1724, two foreigners, Mr Sechmann and Mr Holtzmann, acquired a concession of exporting sulphur from Iceland; and it is said that they exported a great quantity of sulphur for a period of five years; but this export was again discontinued, owing to the death of Mr Holtzmann, who was the leader of the business, and to the apparent unwillingness of Mr Sechmann to repair to Iceland.

In the year 1753 the sulphur-mining was recommenced in Iceland by the Government. First it was commenced in the south, and afterwards, or in 1761, in the north (see "Eptirmæli 18 aldar" —"Review of the Events of the Eighteenth Century"). The author of this work, the late Mr Stephensen, says, that both the mines, the southern and northern, have been worked with considerable profit, adding, that the produce of the mines has amounted to 1400 rixdollars (or upwards of £155) a year; and in 1772

the profit of the sulphur mines in the north, according to the same author, was estimated at 1260 rixdollars (or about £140). After 1806 the Danish Government leased out the sulphur mines in the north to some merchants there for a trifling yearly rent, which in no way was a sufficient indemnity for the deterioration of the mines during the time of the lease.

For ten years ago it was a general opinion that the brimstone in the Icelandic sulphur mines for the most part was embedded in the layer that covers the "live mines," and which must be considered a "sublimate" product of the so-called sulphur pits or caldrons; it had, however, been observed that in the "Fremrinámar," so called, "dead mines" also existed where the sulphur stratum sometimes was a foot thick. The sulphur digging at Krisuvik last year has proved that these strata can be a good deal thicker, as it has also been ascertained that most sulphur mountains contain a considerable quantity of sulphur earth, clayish and ferruginous sulphur; all of which might yield from twenty-five to fifty per cent. of clean sulphur, if managed in the right manner.

When the three naturalists, Mr Steenstrup, Mr Schythe, and Jonas Hallgrimson, travelled through Iceland in 1840, they calculated that the sulphur mines in the north might yield 10,000 rixdollars a year; but Dr Hjaltalin, who, ten years later, was sent to examine these mines, disavows this statement, adding that the mines, as the matter then stood, could by no means yield so much, for the "live mines" were then in a state of deterioration, and that it would be impossible exactly to say how many "dead mines" were to be found till it is ascertained by successive examinations; on the other hand, he is convinced that the mines of Krisuvik might be able to yield 100 commercial lasts (or 200 tons) of clean sulphur a year, and the experience of the recent time has proved this to be no exaggeration; for during the last winter (1868-69) about 250 commercial lasts (or 500 tons) of raw sulphur have been dug up, which must make a good deal more than 100 lasts of clean sulphur at least; further, Dr Hjaltalin observes, that copper ore of rather a good quality is to be found there, and a more recent experience has rendered it likely that there is a considerable quantity of this mineral.

On the other hand, the sulphur must, no doubt, have accumulated to a considerable degree in the mines of the north for the last twenty years they have not been worked; it is, therefore, pretty certain that they might now yield a considerable quantity of sulphur if they were worked in the right manner; but as it must always be borne in mind that no mines are so liable to deterioration as sulphur mines, it must in consequence be very precarious to make them over to foreigners. A French geologist, Mr Eugène Robert, who travelled here in 1835, and afterwards has written treatises on the geology of Iceland in the French language, has also called attention to this point. He says, that care ought to be taken not to lease out to the Englishmen (who then were applying for the lease) the mines in the north, as they might be of great consequence, the sulphur mines of Sicily having begun to fall off.

As pointed out by the history of the country, and sufficiently proved by the experience, the produce of the mines in the north, if worked in the right way, ought to outweigh by far the lease-rent offered by Mr Lock; it would consequently be a downright loss to the country now to lease out those mines to this foreigner, who would not be able to give any satisfactory guarantee for his working the mines in the right manner, but might, after a lapse of several years, return them so spoiled that the country might, for a long time at least, miss the profit which it ought to have by these mines: *indeed the lease-rent offered by the memorialist seems to be comparatively high* when compared to what was paid for the mines in the beginning of the present century, but when it is taken into consideration that the rent now offered is only the tenth part of the net profit which the mines yielded in the sixteenth century, the offer is by no means advantageous, *neither is it desirable that foreigners should be allowed for many years to import into this country a great number of foreign workmen, as this might lead to the Icelanders being deprived of a profitable business in their own native land.*[1]

[1] The words in italics show the good old Æsopian policy, "dog in the manger" redivivus. The Icelandic "hand," when not superintended by foreigners, is idle and incurious as the native of Unyamwezi: he will not work, and the work must not be done for him by strangers! In the Journal I have suggested employment of the natives, who might learn industry by good example and discipline.—R. F. B.

The population of Iceland is, as it is well known, constantly increasing, but several branches of trade are rather in a state of decadence. Nothing could, therefore, be more beneficial to this country, than if here were to be found profitable mines, in which labourers might work in all sorts of weather, and this may be done in sulphur and other mines, as the experience showed at Krisuvik last winter; ten and sometimes upwards of twenty labourers were at work there, almost the whole winter, earning good daily wages. There is nevertheless no security to be had, that the inhabitants shall be able to benefit by this, if the mines are made over to strangers, neither can it be controlled that they shall not destroy the mines altogether, and render them completely useless after a lapse of some years.

The Icelandic sulphur mines are in such a condition as not to be worse for waiting, on the contrary they will improve by it, and it would be greatly beneficial to them, not to be worked for the present.

The sulphur mining at Krisuvik has shown that these mines are better and richer than had been expected; and this may be the case too with the mines in the north, which have most frequently been deemed richer and more extensive than those of Krisuvik.

When sulphur trade has been carried on in this country, both in past centuries and at present, the mode of proceeding has been very inappropriate and unpractical, for partly the sulphur has been carried, with all the dross in it (which often goes up to forty per cent. or more), down to the sea-coast, and from there to Copenhagen; partly the method of cleaning has been so unsatisfactory and inappropriate, as to render the cost of cleaning the double of what is needful. It appears from the writings of the late Bishop Hannes Finsson, that in the time of King Frederick II., the sulphur was cleaned by means of train-oil, and this method has been continued down to the middle of the present century. This was sheer insanity, as it made the cleaning many times more expensive than was necessary, and than it was at the same time in other countries, where sulphur was then cleaned by means of sublimation. But this was not all, the grease moreover that got into the sulphur, rendered it unfit for powder manu-

facture, as may be seen from the writings of Mr Jón Eiríksson and others. Of late a new method has been hit upon in France, namely, to clean the sulphur by condensing hot steam, and as hot springs are to be found in the neighbourhood of all the Icelandic sulphur mines, this might now be turned to a good account for the sulphur trade; besides it would make the cost of transport by far less heavy, if the sulphur could be carried down to the sea-coast and marketed in a clean state.

It results from all this that Mr Lock's offer is by no means so acceptable as some might suppose, for the local government (when established here) might, with the greatest facility, make the mines in the north many times more profitable than they would be if Mr Lock's offer were to be accepted; moreover, the mines being at the disposal of the said government, a sufficient control may be had that they shall not be overworked or destroyed.

Were the Danish Government, therefore, to grant the request of the memorialist, as it is framed, this might easily, as the matter now stands, lead to suits of law between the Government itself and him, on the one hand, and between the said Government and some private landowner, on the other; for it is quite certain that the Government has no right whatever over the sulphur trade in all the localities pointed out by the memorialist. As clearly evinced by the late Bishop Hannes Finsson, the sulphur trade in Iceland can, in no way, be considered as a "regale;" and, accordingly, the Government ought to be very circumspect in this matter, lest it hurt the right of private landowners.

From the above-mentioned motives, it seems to the Committee that it is unadvisable to accept the offer of the memorialist, and, consequently, submits to the honourable "Althing" to dissuade the Government altogether from granting the concession requested by Mr Lock.

But as some members of the Committee have uttered the opinion that it might be considered as partiality, altogether to exclude foreigners from the sulphur trade in Iceland, provided that it could be sufficiently controlled, that this should neither be detrimental to the country in general, or to the mines in

special, the Committee has thought it its duty, if this consideration should prevail in the honourable assembly, to submit a secondary or modified proposal, to the effect that it shall be requested of the Government to make the concession dependent on the following conditions:

1. The memorialist shall himself make the necessary arrangements with the parties concerned concerning pieces, lots, and parcels of land, which he may be in need of, for the cleaning and transport of the sulphur, and which are not at the disposal of the Government.
2. The memorialist shall have commenced the working of the mines within a year from the day on which the licence is handed over to him.
3. The memorialist shall always give the natives of Iceland opportunity to work by halves at the cleaning and transport of the sulphur, and he shall not, for this purpose, employ foreigners more than by halves at most, as far as he offers the same conditions to the natives as to the foreigners, and these conditions shall be acceded to by the former.
4. The Government shall be authorised, at the cost of the memorialist and its own, to be paid by halves, to appoint a man for the purpose of controlling, that the leaseholder shall not destroy the mines for ever by his method of working them.
5. The memorialist shall pay a rent of £100 sterling for the first year; for the next two years, £200; for the next two years thereon, £300; and for the last five years, £400 a year; and the concession shall expire after a lapse of ten years.
6. The memorialist shall, on receipt of the licence, deposit a sum of £5000 as a security for the fulfilment of these conditions, but it shall be returned to him at the end of the ten years, during which he shall have made use of the concession as far as he shall have fulfilled all the conditions that have been stipulated; but otherwise he is to forfeit both the concession and security-money if he shall have infringed any of the above conditions, excepting only if this infringement be caused by diffi-

culties in making such arrangements with the parties concerned on the spot as are mentioned under *head* 1.

7. All disputes arising from this contract between the Government on the one hand, and the memorialist on the other, shall be settled by the said Government alone; and no appeal to courts of law shall be allowed in this case, neither in this country or elsewhere.
8. Both the yearly rent and security-money, if forfeited, shall fall to the Icelandic country-fisc, and be at the disposal of the "Althing."

REYKJAVIK, *the* 14*th August* 1869.

(Signed) JÓN HJALTALÍN. JÓN SIGURÐSSON.
Chairman and Reporter, BENEDIKT SVEINSSON.
TRYGGIR GUNNARSSON.
Secretary, GRÍMUR THOMSEN.

In a most humble petition of the "Althing," dated the 7th September 1869, addressed to His Majesty the King, the said assembly has altogether adopted the considerations and proposals of the Committee, as specified above.

Thus, *in the first place*, the "Althing" begs that the Government of His Majesty *shall not accept Mr Lock's offer* to take lease of the sulphur mines in the north, but, on the contrary, *refuse altogether to lease them out for the present;* and in case His Majesty's Government should not think fit to follow this advice, the "Althing," *in the second place*, begs that the concession, if granted at all, may be made dependent on such conditions as are specified in the above report under *heads* 1 *to* 8.

The only difference between the conditions contained in the Report of the Committee and those in the petition of the "Althing" is: that under *head* 5 is added a clause to the effect that the lease-holder, besides the yearly rent, *shall pay* £10 *a year to the clergyman of "Myvatns-thing"* (*or district of Myvatn*).[1]

[1] The words in italics show the "narrowness of the insular mind:" the idea of £10 per annum being an item of any importance in the extensive operations which would be required to make these sulphur diggings pay!—R. F. B.

SECTION VI.

Sulphur in Sicily.

The kindness of Mr Consul Dennis of Palermo enables me to offer the following sketch of sulphur in Sicily.

Sulphur, it is well known, forms the most important branch of Sicilian commerce and exportation. Found, as in Iceland, in the blue marl which covers the central and the southern parts of the island, its area extends over 2600 square miles; fresh mines are always being discovered, and there is no symptom of exhaustion. In 1864 Sicily worked about 150 distinct diggings, whose annual yield exceeded 150,000 tons; in 1872 these figures rose to 550 and nearly 2,000,000 of quintals, or cantars. The latter contains 100 rotoli (each 0·7934 kilogrammes = $1\frac{3}{4}$ lb. Eng. avoir.), or 79·342 kilogrammes = 175 lbs. Eng. avoir. The richest in 1864 were those of Gallizze, Sommatine, and Favara: their respective yearly production showed 100,000, 80,000, and 60,000 quintals.

"The visitor to a sulphur mine," says Mr Goodwin, late H.M.'s Consul, Palermo, "usually descends by a plane or staircase of high inclination to the first level, where he finds the half-naked miner picking sulphur from the rock with a huge and heavy tool; boys gathering the lumps together, and carrying them to the surface; and if water be there, the pump-men at work draining the mine. A similar scene meets his eye in the lower or second level. Above ground the sulphur is heaped up in piles, or fusing in kilns." This passage well shows the superior facility of collecting sulphur in Iceland, where it lies in profusion upon the surface.

The ore thus obtained by fusion, after hardening into cakes, is carried to the coast by mules and asses, or by carts where there are roads. When the new network of railways covers the island, of course there will be greater facility for transport, but the expense will increase with equal proportion.

The number of hands in 1844 was estimated at 4400—*i.e.*, 1300 pick-men, 2600 boys, 300 burners, and 200 clerks and

others, to whom must be added 2600 carters, and 1000 wharfingers, raising the total to 8000, out of a population (January 1, 1862) of 2,391,802, inhabiting an area of 10,556 square miles.

The following translation, or rather an abbreviation of an article, "Lo Zolfo," in the journal *Il Commercio Siciliano* (March 4, 1873), gives the latest statistics:

"The Committee of Industrial Inquiry, during its recent sessions at Palermo, Messina, and Catania, has collected valuable information upon the general conditions of the island, and upon its principal articles of commerce.

"We will begin with the chief branch, sulphur, whose exportation in the raw state during the last decade is shown by these figures:

In 1862,	= 1,433,000	quintals	= 250,775,000 Eng. lbs. avoir., or 125,387 tons of 2000 lbs.
,, 1863,	= 1,470,000	,,	
,, 1864,	= 1,398,000	,,	
,, 1865,	= 1,382,000	,,	
,, 1866,	= 1,791,000	,,	
,, 1867,	= 1,923,000	,,	
,, 1868,	= 1,723,000	,,	
,, 1869,	= 1,701,000	,,	
,, 1870,	= 1,727,000	,,	
,, 1871,	= 1,712,000	,,	
,, 1872,	= 1,969,000	,,	(estimated).

"Sicily may be considered the monopolist of the trade in natural sulphur. Other solfataras exist in Croatia, Gallicia, and Poland; at Vaucluse in France, at Murcia in Spain, and in Egypt on the Red Sea;[1] but the production may be considered unimportant. Even the Zolfare of the Romagna cannot be compared with those of Sicily, as we see by the following figures of exportation:

In 1862,	= 22,057	quintals.
,, 1863,	= 57,275	,,
,, 1864,	= 35,524	,,
,, 1865,	= 70,841	,,
,, 1866,	= 4,351	,,
,, 1867,	= 2,722	,,

[1] Iceland is here ignored, perhaps from the jealousy which foresees a fortunate rival.

In 1868, = 8,846 quintals.
,, 1869, = 3,885 ,,
,, 1870, = 15,659 ,,
,, 1871, = 12,320[1] ,,

"The annual production of the Romagna mines reaches only 120,000 quintals, including the less important diggings of Latera Scrofaro, Volterra, Grosseto, and Avellino. Sulphurous earth covers all the Sicilian provinces of Caltanissetta (Kal' at el Nisá, the fort of women) and Girgenti,[2] and a part of Catania; whilst there are two isolated ridges (lembi) at Lercara de' Freddi of Palermo, and at Ghibellina of Trapani. Those actually worked exceed 550.

"Experts greatly differ in opinion concerning the supply still remaining for exportation; we have determined that the diggings at the actual rate of exportation may last another hundred years.[3]

"Mining property, according to Sicilian law, belongs to the soil; and public opinion, as well as vested interests, would strenuously oppose the legislation which prevails in upper Italy. Yet the present conditions are highly unsatisfactory. Working upon a small scale in fractionary estates has diminished profits, and in many cases has caused mines to be abandoned. And the evil is ever increasing with the greater depths of the diggings

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[1] These immense fluctuations in the market are probably caused by the *Phylloxera vastatrix* now devastating the Continent. Trieste alone, for instance, has of late years imported as much as twenty cargoes of 200 tons each (a total of 4000) per annum; and the unground sulphur sells at about £7, 10s. per ton as in England. The spread of the disease is likely to cause an increased demand.

[2] In 1864, according to Mr Consul Dennis, the author of Murray's "Handbook of Sicily," the two most important mines of Girgenti were "La Crocella" and "Maudarazzi" near Comitine, belonging to Don Ignazio Genusardi. They yielded annually 140,000 quintals = 10,937½ tons, worth about £70,000, and gave constant employment to 700 hands (chiefly from the opposite town of Arragona), at the daily cost of about £60. The produce was shipped at the Mole of Girgenti, and the road was thronged day and night at certain seasons with loaded carts and beasts of burden, chiefly mules.

Caltanissetta, Serra di Falco, on Monte Carano, and St Cutaldo are villages in the heart of the sulphur district. "The scenery is wild and stern. The mountains are of rounded forms, always bare, here craggy, there browned with scorched herbage, and in parts tinged with red, yellow, and grey, by the heaps of ore and dross at the mouths. Corn will not thrive in the fumes of sulphur; what little cultivation is to be seen is generally in the bottoms of the valleys. The hills around St Cutaldo are burrowed with sulphur mines."

[3] In a recent report to the Italian Government, Sig. Parodi estimates that Sicilian sulphur will be exhausted in fifty to sixty years.

where the inflow of water offers fresh difficulties. The only remedy would be the combination of small farmers, and the massing of the less important diggings under a single 'cultivator.'

"As yet there are only two such associations; and their success in working properties so subdivided as not to pay, recommends them to societies and capitalists. One is at the Croce group of Lercara, where many owners have joined to subscribe for machinery to raise the mineral (*macchina di eduzione*). The other is at the Madore group, also of Lercara; here a considerable part of the very small diggings has of late been let to one and the same 'cultivator.' At Aggira, in the province of Catania, there are two bodies of workmen, called *Gabellotti*, because they unite to pay the annual Gabella (rent-price) to the proprietor. Of these the large and the more successful is at Assaro in the territory of Calascibetta; it has collected eighteen members who formerly injured one another by the mismanagement of the deep diggings and by jealous competition in securing hands. It is a civil society with unlimited liability; some of the associates receive only half shares, which reduces the whole number of *actionnaires* to sixteen. The works are directed by a resident member, and the exportation by another at Catania. It is a good instance of how valueless mines may be made to pay.

"But Sicily, under her present law, has to contend not only against the excessive division of property, but also with the normal conditions of leasing it. Of these, the most injurious is the short term of the Gabella, which averages six, and which seldom passes nine, years. This period, far too brief to permit the use of machinery, which, demanding unusual outlay, secures a much greater amount of production.

"The *Gabella* is generally defrayed in kind, that is, in sulphur at the mouth of the pit. Only one case of money payment is known; in 1868 the Prince of Sant 'Elia, owner of the Zolfara di Grottacalda, leased his property to an anonymous French society, which, besides advances of capital *à fonds perdus*, can afford a high yearly rent. Before this agreement was concluded, the *Gabelle* did not exceed 30 per cent. of the total production; now they have risen to 36, and even to 40. But in this case longer leases were conceded.

"Several of the most important diggings have been let to French and English companies.

"Nothing can be ruder than the mode of working. Where the usual outward signs of sulphur present themselves, steeply inclined galleries called *Buchi a Scale* are driven, and the ore is brought to grass, without any of those preparatory measures which demand time and money, but which afterwards yield so well. The underground works are longitudinal tunnels following the inclination of the sulphur bank, and so cut by cross galleries that the prospect suggests a cavern supported by stalactite columns. The metal, detached with picks, is carried up the rude flights of stairs by children whose ages vary from seven to fifteen, and it is disposed about the pit mouth in a peculiar way, so as to facilitate measurement and distribution.

"When the bank is exhausted, the pillars are attacked, and thus the abandoned portions readily fall in. Accidents at times occur from the pressure of the ground, and these have often caused loss of life; they usually result from the negligence and ignorance of the overseers (*Capimaestri*), men who ignore everything but 'rule of thumb.' The Ministry of Agriculture and Commerce has wisely drawn out a project of mining laws, intended to secure the safety of the workmen by giving information to the directors, and by facilitating works of common interest to those concerned. It is evident that the State can remove the obstacles of sub-divided property, and that its duty is to look after the condition and the health of its subjects who are working 80 to 100 metres underground. Already the ministry has founded a superior school of mines at Palermo, and a second at the Zolfare of Caltanissetta. Let us hope that its term of office may last long enough for carrying out the instruction which alone can develop the sulphur supply of Sicily.

"Here, as elsewhere, the miners' deadliest enemy is water. Of the various draining systems applied to the tunnels, the favourite is a long cut through the gallery, carried to the surface; and its principal merit is the saving of labour where wages are, as in this island, unusually high. But as the disposition of the ground often causes drains to become long and expensive works, there is a general use of pumps. The latter, till the last few years,

were made of wood, and worked by hand; metal has become more common, but steam machinery is almost confined to the foreign concessions. As regards hauling up, shafts, or vertical wells, are almost unknown, although they have been strongly recommended for mines which have reached 50 metres, and *a majori* for those 100 metres deep.

"The metal, when brought to grass, is freed from its earthy matters principally by fusion; the system being founded upon the different degrees of caloric required to liquefy ore and dross. The operation most in vogue is that called *dei Calcaroni:* the heaps are covered with a layer of earth, and the heat is kept up chiefly by burning the sulphur itself. As those kilns are built upon inclined surfaces, the melted matter flows into wooden forms, where it cools and solidifies. The great loss, calculated at about one-third, has led to a variety of improvements; many have been adopted by private cultivators, few have been more extensively applied, and none can boast of complete success. The best hitherto produced is the so-called 'vapour-fusion' invented by a certain Sig. Thomas, and patented to the *Società privilegiata per la fusione dello Zolfo in Italia,* an anonymous body, whose headquarters are at Milan. The essential part of the process is to separate the ore by ordinary fuel, using for the transmission of caloric water-steam at the tension corresponding with the temperature which fuses sulphur. The Society established its apparatus at several mines, which paid a proportion of raw sulphur as bonus to the patentees; the remainder went to the 'cultivator' as remuneration for the mineral which he provided. Many were disused after a few months, the reason alleged being that they were of use only when applied to poor ores and gypseous gangues. Lercara is the only place which still works by 'vapour-fusion.'

"The sulphur is exported either in lumps (*ballate*[1]), as it comes from the moulds, or it is refined to suit the intended object. That used for vines is ground before exportation; there are mills at all the ports, and the expense per quintal reaches only a few centimes. The powder is stored in sacks.

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[1] Each *ballata* weighs 70 rotoli = 122½ lbs. avoir., and two are a mule-load.

"Sicilian sulphur is sufficiently pure, as a rule, to be directly adopted in many chemical and industrial processes. For the pharmacy, however, for gunpowder, and for other specialties of technology, further refining is necessary. This operation is limited on the island by the high price of fuel; there are only two or three *usines* at Catania and at Porto Eurpedoch; moreover, these work irregularly, and on a small scale. Thus the refinery of Sicilian and Romagna sulphurs is carried on almost exclusively abroad.

"The principal exporting places are Catania, Licata, Palermo, Porto Eurpedoch, Terranova, and Messina. The following are the approximate figures of the respective harbours:

Catania	ships,	202,000	quintals.
Licata	,,	460,000	,,
Messina	,,	50,000	,,
Palermo	,,	78,000	,,
Porto Eurpedoch	,,	917,000	,,
Terranova	,,	200,000	,,

Palermo offers great advantages of freight by means of return colliers, but the distance of land transport is fatal to all but the sulphur of Lercara.[1] Messina exports only to the United States; sulphur forms the heavy cargo, the lighter being composed of rags, oil, and *agrumi* (sour fruits, lemons, etc.). But if there is little shipping of the mineral at Messina, she may be called the headquarters of the sulphur trade. Embarkation takes place at other harbours, though there are often badly protected roads; the only reason being their neighbourhood to the mines. Messina[2] urged upon the Committee a reduction of tariffs on the railways which connect it with Catania and Leonforte; but it would be hardly fair thus to protect one city when its rivals, besides being favoured by topographical position, are industriously improving their means of embarkation, and are making efforts to protect shipping during winter.

"At all the harbours there are merchants who make the export their specialty; they buy up the produce of the smaller mines,

[1] On the northern flank of the range, which, running from north-north-east to south-south-west, nearly bisects the island. It is a mean town in the mountains. Licata, the southern port, is nearest to the central mines.

[2] Her chief exports are fruit, oil, and silk.

store it in their magazines, and ship it when the prices are most likely to pay. The principal 'cultivators,' however, have established their own deposits, and export on their own account without using middle-men.

"An intelligent merchant at Messina assured the Committee that two-thirds of the total consumption took place in winter and the rest in summer, whilst the exportation during the latter season is by far the greatest on account of the superior ease and safety of navigation. But, as the melting is mostly in September, the results to cultivators and to exporters are, that a large part of the year passes away in inaction, accumulating interest upon cargoes and seriously checking profits.

"It is greatly to be desired that some company with large capital should be formed to make advances of money, thus setting free the modest means of 'cultivators' and merchants, and enabling them to lay out more upon the mines.[1]

"The actual medium price (March 4, 1873) of sulphur in the Sicilian ports is represented by twelve lire (or francs) per quintal; and the following are the approximate items which make up this figure:

Cost of mining,	= 6·600	lire or francs.
Land transport,	= 2·480	,,
Embarking,	= 0·313	,,
'Cultivator's' profit,	= 1·607	,,
Export dues,	= 1·000	,,
Total,	12·000[2]	,,

"After a few years, when the network of railways shall have been finished, when embarkation is improved, and perhaps when the production is rendered easier and safer, we may hope to see the figure L.12 fall to L.11, and even to L.10.50.

"The Committee has hitherto considered only the produce of Sicily *per se*, and this appears the place to notice its future production and its employment in the general commerce of the world. Many have indulged in exaggerated hopes and fears

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[1] "Trust" seems to be the *beau ideal* of trade where it has not been tried. I have seen its workings in Africa and in Iceland, and my experience is that it is a *pis aller* which gives more trouble than it is worth.

[2] Here it is not stated whether paper or specie "lire" are meant.

upon this subject. While some fear that our mineral may be superseded by other substances, others hope that the reduced cost of Sicilian sulphur may enable it to serve the purposes for which pyrites are now generally used.

"An attentive examination of the question proves that, in the actual state of industry, sulphur and pyrites have nothing to fear from each other.

"Several industries, especially the manufactures of sulphuric acid, do not require pure sulphur in the free state; they find it more economical to extract that contained in metallic sulphures, especially in iron pyrites. On the other hand, it is well known that extracting pure sulphur from the sulphures and manufacturing sulphuric acid from pure sulphur are practically impossible; the former could never contend against the Sicilian mines, nor can the latter rival the cheap produce of pyrites. As the uses of the two are different, so will be their sources of supply; and it is hard to believe that any change of price can cause *concurrence* between the two.[1]

"A fair proof is the concurrent development of both articles. Between 1832 and 1872 the produce of the Sicilian mines has quadrupled; and this was exactly the time when pyrites began to be used, and successfully took their place in the manufacture of sulphuric acid.

"These considerations should silence the arguments which contend for the abolition of export duties upon sulphur, in order to make it compete with pyrites. The State draws an annual revenue of some two million lire (2,000,000 francs = £80,000); and it cannot be expected to yield so legitimate a source of income, until at least assured by competent persons that the impost is a weight upon, and a damage to, Italian industry and commerce."

To this very fair report Mr Consul Dennis adds: "I have no notion that the supply of Sicilian sulphur is nearly exhausted; more deposits are known than can be worked. There are many spots in the heart of the island which abound in the mineral, but it

[1] It would be better to state that sulphur costing above £5 per ton cannot at present compete with pyrites; sold below that price it would soon drive its rival out of the market.

must lie useless, for as yet there are no means of conveying it to the coast for shipment. The export of sulphur has been increasing greatly, it is true, from 100,000 tons (=£400,000) in 1855 to 200,000 (=£1,000,000) in 1871, but the export is regulated rather by the demand in foreign markets than by the supply. *The large quantity made from iron pyrites of late years in many European countries has, of course, much lowered the demand on Sicily.* In 1871 the quantities fell to 180,000 tons (= £956,000), but in 1872 they rallied to 192,000 tons. This quantity was thus distributed :

Great Britain and her colonies took	46,418	tons.[1]
France, ...	41,699	,,
United States, . . .	21,846	,,
Germany and Austria, . .	22,348	,,
Italy and the East, . .	47,160	,,
Russia, ...	1,526	,,
Spain and Portugal, . .	8,236	,,
Other countries, . .	3,008	,,
Grand total,	192,241	,,

"I should remark that the quantities stated above are from the official returns of the custom-house ; they are probably understated to the extent of 25 to 50 per cent., few exporters declaring the full quantity or value, and the Doganieri having scant interest to verify the declarations. The amount exported last year (1873) was probably not much under 300,000 tons.

"The great rise of prices in the necessaries of life of late years, and the increased demand for labour, consequent on the construction of railways, harbours, and other public works, have doubled the price of sulphur in Sicily. But when the network of railways with which it is proposed to intersect the island is completed, when the country roads are laid out to feed them, and when the ports of Girgenti, Licata, and Catania, are enlarged and deepened, so as to accommodate vessels of large size, then it will soon be ascertained what treasures of sulphur Sicily still contains."

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[1] "Brimstone" in the *Mining Journal* (September 19, 1874) made England import in 1872 a total of 50,049 tons (= £336,216), but in 1873 only 45,467 tons (= £299,727).

In conclusion I would observe that this age of national armies and bloated armaments is not likely to allow decline in the use and the value of sulphur, and that nothing can be more unwise than to rely upon a single source of supply, Sicily, which might at any time be closed to us by a Continental war.

RICHARD F. BURTON.

NOTE ON THE COMPAGNIE SOUFRIÈRE OF THE RED SEA.

Schweinfurth ("Heart of Africa"), when passing down the Red Sea, speaks of the Sulphur Company at Guirsah. Its concession extends over 160 miles of coast southwards from Cape Seid. The ore is obtained from gypseous schiste; and all the fresh water for the workmen, of whom there are over 300, must be brought from the Nile.

I need hardly remark that if sulphur is found to pay under these circumstances, we may expect great things from Iceland.

SECTION VII.

SULPHUR IN TRANSYLVANIA.

According to Mr Charles Boner (p. 312, "Transylvania: its Products and its People," London: Longmans, 1865), the whole district round Büdös contains rich deposits of sulphur; and yet Hungary draws her supplies from the Papal States and Sicily; yielding, as the latter has hitherto done, a million and a half hundredweights per annum. So with sulphuric acid which has played so important a part in raising the industry of Europe to its present state. A single commercial house in Kronstadt employs nearly 300 cwts., and would probably use more were its price not so high. The sulphuric acid factory at Hermannstadt, the only one in the province, uses 300 to 400 cwts. annually. The custom-house returns for Tran-

sylvania vary from 300 cwts. to 3000 cwts., as the article comes sometimes from Trieste, sometimes from Vienna, where the duty has already been paid. In 1863, the amount of sulphur produced in the Austrian monarchy was 35,085 cwts., at an average price of 6fl. 44kr. per cwt. The consumption has regularly augmented owing to the increase in the number of soda factories: in 1858, the import from foreign states was 71,337 cwts.; in 1859, it was 86,673. Mr Boner has profited in the following remarks by two reports made by M. Brem, director of a chemical factory at Hermannstadt, and by Dr F. Schur, professor at Kronstadt:

"The sulphur-deposits are situated at the south and west of Büdös,[1] and not on the mountain itself. The places are Kis Soosmezö, also Vontala Feje Búlványos, and a little above the chalet Gál András. Thirty different diggings were undertaken in a circuit of at least eighteen miles; but the extent of the ground where the deposits are, is more than three times this size. The deposits run in unequal strata of from one to nine inches under the mould, which varies in thickness from one to three feet. The soil was everywhere saturated with sulphur, and in this permeated earth pieces of pure sulphur were found. They were of pale-yellow colour, fine-grained, and with a strong smell of sulphuretted hydrogen. Here and there only was a sort found with a certain hardness (cohesion), and even this, when dried, became brittle and ticturable. All this shows that the mineral is a true volcanic sulphur, and that the deposits will continue as long as the inner activity of Mount Büdös lasts. A careful analysis gives as result, in the earth taken in one place, 63·96 per cent.; in a second spot, 61·00 per cent.; and in a third, 41·01 per cent. of sulphur."[2]

[1] Büdös is elsewhere described as a pointed cone of trachyte 3745 feet high, a solfatara or volcano, which, though never in actual eruption, incessantly pours forth streams of sulphuretted hydrogen gas, and these act as vents for the forces generated in the depths of the earth.

[2] The following is the analysis of the aluminous earth near Büdös:

Sulphuric acid,	51·59	per cent.
Water and sulphuric clay, mixed with lime,	3·54	,,
Clay,	18·98	,,
Silica,	14·00	,,
Lime,	9·65	,,
Potash,	1·00	,,

"The district whence the earth was taken is a space of 16,000,000 square fathoms. Allowing for interruptions in the deposits, and taking these at an average thickness of three inches instead of nine, 200 lbs. of sulphur might be obtained from every square fathom, even if we suppose the earth to contain only 50 per cent. of the mineral. But we have seen that it has 61 per cent., and, in some cases, nearly 64 per cent. of sulphur. Continuing the calculation, the district would contain 16,000,000 cwts. of the precious commodity. Ten years ago, raw sulphur from Sicily and the Papal States (*viâ* Trieste) cost, in Hermannstadt, 9½ florins per cwt. Competent authorities are of opinion that it might be produced here for 5 florins per cwt., inclusive of the carriage from Büdös to Kronstadt. Sulphur costs more than this in the places where it is produced in Poland, Slavonia, and Bohemia. Every year the demand for the article increases, for almost each year brings with it new appliances, and shows how indispensably necessary it is in the daily life of civilised communities. We all know what are the profits arising from chemical fabrications; and I think the facts here given will hardly fail to attract the attention of those who are willing to turn their knowledge and spirit of enterprise to account. For Transylvania at large, but for Kronstadt especially, it would be of the greatest advantage to obtain the article in question at a cheaper rate; for not only might undertakings, which, as yet, are but projects, be called into existence, but others already thriving be considerably enlarged."

SECTION VIII.

Extracted from "Adventures and Researches among the Andaman Islanders." By Frederic J. Mouat, M.D., F.R.C.S., etc., etc., etc. Hurst & Blackett, Publishers, London, 1863.

The sulphur on the top of the cone occurs in such quantity in the cracks and fissures, often lining them to the thickness of

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more than half-an-inch, that the question naturally arises whether the sulphur could not be worked with advantage.

Although in the immediate neighbourhood of the crater, where the fissures are numerous, the ground seems to be completely penetrated with sulphur; this is so evident in other parts, only a few feet lower, where the surface is unbroken. There are, however, some reasons which seem to promise that a search might be successful. In eruptive cones, like that of Barren Island, there is always a central tube or passage, connecting the vent in the crater with the volcanic action in the interior. In this tube the sulphur, generally in combination with hydrogen, rises in company with the watery vapour, and is partly deposited in the fissures and interstices of the earth near the vent, the remainder escaping through the apertures.

If in the present case we admit the sensible heat of the ground of the upper third of the cone to be principally due to the condensation of steam—a process of which we have abundant evidence in the stream of hot water rushing out from underneath the cold lava—it is not improbable that the whole of the upper part of the interior of the cone is intersected with spaces and fissures filled with steam and sulphurous vapour, these being sufficiently near the surface to permit the heat to penetrate. It is therefore not unlikely that at a moderate depth we should find sulphur saturating the volcanic sand that covers the outside of the cone.

I only speak of the outside, as we may conclude from the evidence we have in the rocks of lava in the crater, and those bulging out on the side, that the structure of the cone is supported by solid rock nearly to its summit, the ashes covering it only superficially.

From what has been said above, the probability of sulphur being found near the surface, disposed in such a way as to allow of its being profitably exhausted, will depend on the following conditions:

First, That the communication of the central canal, through which the vapours rise, with its outlets, be effected not through a few large but through many and smaller passages, distributed throughout the thickness of the upper part of the cone.

Second, That some of these passages communicate with the loose cover of ashes and stones which envelops the rocky support of the cone.

Although I have mentioned some facts which seem to indicate the existence of such favourable conditions, and which are moreover strengthened by an observation by Captain Campbell, who saw vapour issuing, and sulphur being deposited near a rocky shoulder, about two-thirds of the height, on the eastern descent of the cone; still their presence can only be ascertained satisfactorily by experimental digging. . . .

If a preliminary experiment should make it appear advantageous to work the cone regularly, the material about the apex, after being exhausted of the sulphur that is present, could, by blasting and other operations, be disposed in such a way as to direct the jets of vapour in the most convenient manner through uncharged portions of ground. If the sulphur should aggregate in periods of not too long duration, it would be possible to carry on the work of filling up new ground on one side, and taking away saturated earth on the other at the same time—so that, after working round the whole circumference, the earth that had been first put on would be ready to be taken away.

If the periods should prove too long to allow the work permanently to be carried on, an interval of time might be allowed to pass before resuming operations.

Water for the labourers could always be obtained from the warm spring at the entrance of the island.

The distilling, or melting, of sulphur, to separate it from adherent earth, is a matter of comparatively little expense or trouble. If the sulphur be abundant, it might be effected as in Sicily, by using a part of it as fuel. It is not necessary to do it on the spot; it might be done at any place where bricks and fuel are cheap.

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